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Master's Thesis

# A COMPARISON OF SUPERIOR AND MARGINAL STUDENTS OF STENOGRAPHY AS A BASIS FOR PROGNOSIS

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# CHAPTER I

## STATEMENT OF THE PROBLEM

It is quite generally recognized that approximately fifty per cent of all students entering the stenographic curriculum for vocational purposes fail to meet the requirements set up by that course or fall short of the standards expected by the businessmen who later employ them. Leading educators in business education believe that mortality in shorthand can and should be cut down. One proposed measure is through a more careful selection of students for the various courses offered by the school which they attend.

Since stenography is probably more sensitive to changing business conditions and teaching methods than any other business subject; and since stenographic positions are becoming more and more limited because of changing business conditions; it seems logical and just from the standpoint of the student, the school, and business to train only those students who give fair evidence of success.

As the various terms used in this introduction will occur frequently throughout the paper, it may be well to acquaint the reader with the definitions which particularly apply to them in this work.

Business education: That area of education which develops skills, attitudes and understandings essential for the successful direction of business relationships.

Curriculum: a systematic group of courses or sequences of subjects required for graduation or certification in a major field of study.

Stenographic curriculum: Course offered generally in the last two years of senior high school, grades eleven and twelve, to prepare students to become future stenographers and secretaries. "Secretarial Office Practice," or "Secretarial Course" are often used synonymously.

Guidance: Technique of leading a child to a purposeful good by arranging an environment that will cause him to feel basic needs, to recognize these needs, and to take purposeful steps towards satisfying them.

Vocational purposes: The intention to fit students for definite work after graduation. It is here used to distinguish from "personal use."

Prognostic test: A test intended to predict a person's probable success in or aptitude for a given line of endeavor, as indicated by present performance.

Aptitude test: A device or test designed to indicate a person's potential ability for performance of a certain type of activity.

Mean: Any one of several calculated averages.[1]

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[1] Good, Carter V., Editor, Dictionary of Education, prepared under the Auspices of Phi Delta Kappa, University of Cincinnati, McGraw-Hill Book Company, Inc., New York, 1945.

A statement from the Vocational Division of the United States Office of Education in 1943 brought the matter of failures forcefully to the attention of educational leaders:

> The Public Schools of the Nation have been, and still are, offering training in commercial courses to many more persons than could be absorbed in office positions by business and government. About 13,000 public high schools offer commercial courses, in which 1,000,000 pupils are enrolled in typewriting and approximately 750,000 pupils in shorthand and bookkeeping. Unfortunately, however, less than 50 per cent of those who complete a commercial course are sufficiently well trained to meet the minimum employment standards of business and of government.[1]

Commenting on this statement, Professor F. G. Nichols of the Graduate School of Education, Harvard University, and for many years an authority in business education, goes still further:

> A much sadder fact is the one recently stated at the Eastern Commercial Teachers Association meeting to the effect that not more than 10 per cent of those who enroll for business courses make the grade in terms of occupational competency. Business teachers and schools in general are prone to stress the success of their graduates, or some of them, while overlooking the failures and dropouts along the way.[2]

After emphasizing the importance of pressing beyond the basic skills and attempting to reach a more defensible objective

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[1] Vocational Division of the U. S. Office of Education, "Vocational Training Problems When the War Ends," The Business Education World, 20:82-83, October, 1943.

[2] Nichols, F. G. "The Status of Business Education." The Business Education World, 20:82-83, October, 1943.

in terms of occupational competence, Nichols continues:

> But why go on? The record speaks for itself. Proof of the statement under review is abundant. The New York Inquiry furnished much. The dearth of competent clerical workers for recruitment in the war effort supports the view presented. The recent comprehensive follow-up study made by a national association of high school principals reveals much that should be disconcerting to complacent business educators. All studies agree on the essential facts.[1]

Thus is it generally admitted that there are too many enrolled for business courses who either drop out along the line or fail in the end. Business educators have long since accepted the criticism given to this particular section of business education, but the emergency period of World War II more or less shocked them into more positive action. Educational periodicals are replete with suggestions as to ways and means of improving school programs in order to meet the growing demands of business today. Teachers, administrators, and employers are collaborating in an effort to bring about greater coordination between the school and business.

For those of us engaged in the training of stenographic personnel, there is a challenge to do all in our power to bring about these important changes. Simply to read suggestions and comment upon them will not be sufficient. We must become conscious of the weaknesses in our present system and realize that post-war conditions will not wait while we

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[1] Ibid.

flounder around with discussions for another decade.

Another point that we in business education must guard against is a certain complacency that gained foothold during the war years when there was no difficulty in placing our stenographic students in worth while positions. With so great a demand for workers during the emergency period, it was possible for students of limited ability and training to secure work in business offices. Standards were lowered by business and, it is feared, by schools also. Now, however, business expects the schools to turn out students who are equipped to fulfill initial positions satisfactorily. Forced to inaugurate training programs and refresher courses because of inadequate school training, business no longer desires to continue this practice declares Claude V. McBroom, former President of the National Office Management Association in an address given before the Central Business Association and the Iowa Commercial Teachers Association:

> .....During the war, because of the great demand for workers there was a willingness to accept a much poorer grade of help. To correct this situation, industry has been compelled to inaugurate all sorts of training programs and refresher courses. Business wonders whether it will have to continue such courses or whether the schools will accept the challenge. We constantly hear office managers, comptrollers, personnel directors, and others in charge of, or interested in, clerical work say: "What is wrong with the high school?"[1]

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McBroom, Claude V. "N.O.M.A. Cooperation with Business Education." Journal of Business Education, September, 1944. p. 15-16.

Neither are the teachers of business subjects unmindful of the need for a more thorough preparation of those students who plan to enter industry at the termination of their high school course. Esther Vanderlas expresses the opinion of many teachers when she writes:

> It is the responsibility of business teachers to maintain high standards in all business subjects even though at the present time many organizations and agencies have been forced to employ incompetent persons for stenographic and general office work. The day is not far off when business men will refuse to employ high school students with only a knowledge of office skills. In order to work toward such a standard, business teachers must constantly keep in mind the requirements and standards of the actual business office and must measure each student's ability in terms of how successful that student will be on the job.[1]

But teachers must teach to the best of their ability the classes assigned them. Failures will scarcely be lessened nor maximum skill attained unless provision is made for the segregation of students into those curricula where the requirements are suited to their aptitudes and abilities. The future holds promise of this as is pointed out by Paul F. Muse of Ohio State University:

> Vocational business education will offer work that is purely vocational in nature and content and worthy of its name. Unhampered by the presence of incapable and uninterested pupils, it will prepare well qualified workers for business occupations.

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[1] Vanderlas, Esther H. "Higher Standards in Shorthand and Typewriting." Journal of Business Education, April, 1945. p. 25-26.

> This will mean greater selectivity of pupils and a more thorough mastery in achievement. Vocational business education will be viewed in the light of office demands. Peace will bring the greatest expansion in peacetime industry that we have ever experienced. With this expansion will come elevated standards and unprecedented demands for qualified workers.[1]

If it is incumbent upon us as business teachers to give to industry the best material we can produce, and if it is necessary for the schools to revise the courses offered in order to take care of the growing demands of business, how much more important is it that we view the entire matter from the standpoint of the student. Should we not realize that it is our duty to help develop each boy and girl to the best of his capacity, to help him make an intelligent choice so that his chances for success will be proportionate to those of everyone else. For this purpose, wise vocational guidance is necessary, and if the school does not recognize this importance it is failing in its responsibility to assist.

Because the vocational choice of each individual is one of grave importance to himself and to society, affecting as it does the whole economic structure of the nation, Agnes Conwell's advice is worthy of mention:

> Wise vocational guidance will prevent much disappointment among pupils who choose to prepare for business careers. It will save businessmen financial loss through the employment of incompetent workers, a loss which in the end society

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[1] Muse, Paul F. "A Look into the Future at Business Education." Business Education World, June, 1944. p. 563.

> must bear. In turning out poorly equipped job seekers, the school is neither serving the individual nor the business world.
>
> The talents of pupils should be conserved through proper guidance. Giving students of limited ability training for a higher specialized type of work is to train for failure.[1]

It is no doubt due to the ignorance of parents and students and even to the misconceived notion of teachers and administrators regarding prognosis and guidance that success in this area has been limited in the past. Prognosis, as one factor in guidance, is not primarily for the purpose of rejecting a student from a particular study but rather for the purpose of directing him into that field for which he is best fit. It does not say, "You aren't good for anything we have to offer, therefore, go away and find something else;" but counsels him, "Here is what you are good in, and therefore, you should take the training for that." If and when prognosis is looked upon in this light, one weak link in our educational program will be strengthened.

Apprehending the evil that will result from lack of correct guidance in our secondary schools, Father Sullivan of Creighton University, pleads for that type of education and guidance which will permit our youth to find greater purpose in their schoolwork and which will eliminate future unhappiness and heartaches.

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[1] Conwell, Agnes E. "The Futility of Commercial Education Without Guidance." Education, 55:414, 1935.

> We can realize the gravity of leaving vocational guidance out of the school program by heeding the fact that unrest and discontent are found almost exclusively among those who have spent considerable time in securing an education that has not prepared them to find a place in the world of work. By disregarding this phase of the adolescent's education, we are not only robbing them of their rightful chances of securing economic freedom, but just as serious, we are sowing the seeds of future disorders in the social, political and moral order, thereby jeopardizing not one but all of the four freedoms which are every child's God-given heritage.[1]

Father Sullivan concludes his plea for vocational guidance by pointing out the two causes which, in his opinion, result in personal tragedy and economic waste:

(1) ignorance of the opportunities that lie ahead, and

(2) ignorance of the individual's peculiar powers.

That youth is fortunate, he maintains, who receives his education in the school which recognizes these two causes and consequently sees to it that the student is protected against disappointment and failure.[2]

Although the diminishing of failures through guidance involves the entire school program, it is particularly with the subject of stenography, wherein the number of failures has been perhaps greater and more noticeable than with the other subjects, that this paper is concerned. The question

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[1] Sullivan, Daniel C. "The Case for Vocational Guidance." Catholic School Journal, 44:217, 1944.

[2] Ibid.

is then: Shall business education (superintendents, principals, and teachers) continue to allow these large percentages of failures in shorthand? Upon what criteria can we best determine those students qualified to pursue stenography on a vocational basis? What guidance will we offer our youth so that they will feel equipped upon the completion of their high school studies to enter business with all possible hope of security and future success?

The purpose of this study is to endeavor to partially answer these questions according to the following outline:

1. To show by reports from competent authority that there are great numbers of failures in stenography.
2. To point out the wisdom for greater selectivity of students who wish to take the stenographic course.
3. To study the scholastic records of the stenographic students of a large high school over a period of five years--1943-1947.
4. To work out a difference between the mean of specified subjects with stenography.
5. To determine by means of the t test the significance between these means.
6. To formulate a more reliable procedure for selection of students for the stenographic course.

# CHAPTER II

# PREVIOUS RESEARCH IN THE FIELD

Many attempts have been made to develop some kind of test or other means of measurement for prognostic use in connection with instruction in the business subjects. Perhaps the greatest hindrance to the success of such a venture is an innate abhorrence to submit to a testing program and the disbelief as to the results of the test. Yet, testing is nothing new. Before the time of Christ, the Chinese attempted to select workers by means of a Civil Service Examination,[1] and today few occupations can be entered without due testing. In most fields of human endeavor the most efficient results are attained when the worker has definite goals toward which to work and some means by which he can measure his accomplishments.

It may be truthfully stated that in the field of education and particularly in that area of business education, the scientific method of testing is relatively new. However, great progress has recently been made in the testing area and educators are realizing more each day that research and improved methods must be continued.

In business education we have several aims for testing

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[1] Ross, C. C. Measurement in Today's Schools. New York, Prentice-Hall, Inc., 1941.

because of the complex nature of business itself. At some time or other in the business training of a student it is necessary to use practically every type of test. At one time it is intelligence, again aptitude, or skill, at another time achievement, which we must measure. In our guidance programs, therefore, it is necessary not only to have a well organized testing program, but we must be able to interpret the results, so that our pupils may improve according to their capacities and aptitudes.

According to Blackstone[1] the two major purposes of tests as they are applied to business education are first, to measure the progress of the student in a certain subject or group of subjects, including a diagnosis of unsatisfactory progress; and secondly, to measure the aptitude of the students so as to predict as to their vocational future. Under the first class we have the achievement and diagnostic test, and under the second, the aptitude test. To these could be added rating scales and character and personality tests.

But why make a case study of Mary Jones? Why be so scientific about measuring the progress of John Smith? Why diagnose a failure? Why try to predict and to control future events? Edwin A. Swanson, head of the department of commerce

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[1] Blackstone, Earl G. Commercial Education in Secondary Schools. New York, Ginn and Company. p. 331.

at Arizona State Teachers College, says that the desire and need for prediction is ever present.

> Predictions are made in all phases of living. Parents predict achievements for their children. Farmers predict when the rains will come. Politicians predict how the citizens will vote. Storekeepers predict what and how much their customers will buy. Elementary teachers predict which of their pupils will succeed in high school. Employers predict which applicants will make the best employees.[1]

Predictions involving as they do too much of a chance factor, it is not surprising that specialists in any phase of human activity, educators for example, seize upon the promises of the scientific method and research techniques. Neither is it surprising to find prognosis recorded as a major educational problem. The entire educational system from nursery school through higher and adult education, is constantly and necessarily concerned with prognosis.

Eurich and Cain write that "as a scientific procedure in education, prognosis involves the prediction of future attainments from accurate records of clearly defined behavior."[2]

Closely related to prognosis is the important factor of aptitudes. "Aptitude," says Bingham, "is a condition, a set

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[1] Swanson, Edwin A. "Prognosis in Business Education." The National Business Education Quarterly, 11:11-14, 1943.

[2] Eurich, Alvin C., and Cain, Leo F. "Prognosis," Encyclopedia of Educational Research. New York, The Macmillan Company, 1941.

of characteristics or combination of traits, systematic of capacity to acquire specified proficiencies or modes of behavior."[1]

Greene, Jorgenson and Gerberich parallel aptitude tests with intelligence tests, although narrower in scope. "The various types of aptitude tests largely possess in common the characteristic of testing the individual's potentialities in terms of the specific abilities resulting from inheritance and general experience but of disregarding the abilities resulting from specific training or education."[2] They are often called specific intelligence tests.

As was mentioned before, there are many people, and some of these in the field of education, who are dubious as to the result of any prognostic measurement or aptitude factor. How convincing is the research related to the inherency of aptitudes? Is it possible to isolate aptitude factors? Swanson hopes that the lack of faith in prognosis as revealed by these questions is being removed by recent research.

> Aptitude tests are used in classifying thousands upon thousands of men in the armed services. Undoubtedly the experience gained here will push the horizons back still further. Indeed, it should be recognized that some of

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[1] Bingham, Walter V. Aptitude and Aptitude Testing. Harpers and Brothers, 1937.

[2] Greene, Harry A., Jorgensen, Albert N., and Gerberich, J. Raymond. Measurement and Evaluation in the Secondary School. New York, Longmans, Green and Co., 1946. 670 p.

> the controlled situations needed to establish the validity and reliability of research in aptitudes are inherent in the war set-up.[1]

It must be admitted, however, that although prognosis in the field of secondary business education has received considerable attention, and many tests for clerical and office occupations have been prepared, the prognostic value of these tests is still very limited. There is great need for further detailed research along these lines, as will be noted when we study what has already been done and are forced to the conclusion that previous works are fragmentary, lacking of criteria, incomplete, and in many other ways subject to criticism.

Eurich and Cain, in their research report on prognosis in the Encyclopedia of Educational Research, summarize the need for research as follows:

> As research in prognosis now stands, there is a definite need for:
>
> (a) more valid and reliable measures, particularly of personality factors that seem to play a large part in the success of the individual;
>
> (b) comprehensive follow-up studies over a period of years and further analysis of cumulative records in many schools;
>
> (c) studies of factors that enter into satisfactory occupational adjustment;
>
> (d) further investigations of prognostic value of ability patterns and differential prognosis;

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[1] Swanson. op. cit.

> (e) continuous studies of occupational trends and the changing requirements concerning human qualifications in relation to trends.[1]

Before going into the study of the efforts of some of our business teachers and specialists in the prognostic area of testing, let us first investigate the school, business, and society and ascertain their views on the advisability of prognostic testing. In every instance, they will not term it "prognosis", but they will emphasize the need for greater selectivity through some process--and whatever this process may turn out to be, it will be made up of prognostic factors.

Charles E. Benson of the Department of Educational Psychology, New York University, shows that in the acquiring of a skill an accompanying degree of intelligence must be present, and that the higher the skill, the greater degree of intelligence required. This is particularly true of the shorthand and typewriting student.

> Usually, as he came up through the elementary schools he gradually, by the trial and error method, made discoveries and formed habits that served him well enough in the study of the knowledge subjects. Now for the first time in his school career, he is called upon to acquire skills. A little guidance . . . . . will do more than the imposition of great amounts of additional practice to be done in an unthinking, futile, and resultless fashion. Skills are indispensable for efficiency. All of life depends, for its effectiveness and efficiency,

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[1] Eurich and Cain. *op. cit.*

> upon the organization of the motor and the intellectual skills.[1]

The "little guidance" spoken of by Dr. Benson is another way of saying that some measure of the student's aptitude and ability should be gauged before he spends a great deal of time in "unthinking, futile and resultless practice."

Enlarging upon the conception of skill that is needed for stenography, Doctor John L. Tildley also stresses the need of intelligence accompanying skill and looks upon English mastery as a prerequisite for successful stenographers.

> The time is past for merely setting down and transcribing symbols. The stenographer must understand the idea he is recording and must be able to express it in acceptable, idiomatic English. Skill in recording and transcribing is not a matter of mechanically hearing and fingering, but of each of these elements directed by an understanding and cultured mind.
>
> With the rising mentality of business executives, their broader vision of the world, the richer vocabularies they possess, the young stenographer must also have this broader vision of the world, this greater command of ideas, this store of words adequate for their expression.[2]

If so great skill is necessary for the mastery of shorthand and if a stenographer's mentality must in some wise match that of the business executive, there should be some

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[1] Benson, Charles E. "The Psychology of Skill." Business Education World Service Booklet, No. 9, p. 6-10.

[2] Tildsley, John L. "A Larger Conception of Skill." Business Education World Service Booklet, No. 9, p. 11-13.

way of predetermining whether or not the students wishing to enter upon so exacting an occupation have the intelligence, the ability and the skill that will result in the successful completion of their desires. Prognostic testing would seem to produce a rather accurate forecast.

Mr. Cutshall in his article, "Future Problems in Business Education," parallels the business teacher with the manufacturer, saying we are engaged in a productive enterprise in which we propose to take the raw material consisting of boys and girls of today and convert them into useful citizens and workers of tomorrow. Just as the manufacturer makes a survey to determine what raw material is available with which to work and then chooses that material which will make a worthy product, that the market will be able to rely upon, so, too, must the business educator form the raw material of boys and girls into useful and worthy citizens of tomorrow.

> We must follow a similar procedure in our work. This means we must establish certain standards for those students who desire to become stenographers, another set of standards for those who desire to become bookkeepers, and so on for each different group of students. This calls for a definite program of selection and guidance.[1]

Such a program of selection in our business curriculum should not seem an unfair procedure when viewed in the light of future selection in the actual business world. What

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[1] Cutshall, Paul W. "Future Problems in Business Education." Balance Sheet. January, 1942. p. 209.

business or profession is there that makes random selection of those who apply for admission? The ultimate success of any business enterprise is largely conditioned by its capacity to mobilize and motivate a large group of people doing their assigned tasks effectively. This view was presented in a survey of employers with respect to the use of tests in the employment of clerical workers.

> A vital step in the mobilization procedure--and a continuing one--is that of selecting from the applicants for a position the required number of persons who not only possess sufficient technical skill to make top-notch "producers" but are amenable to suggestion and direction, capable of working with their fellow employees as members of a group, able and willing to conform to new work-habits, dependable, loyal, with capacity for growth.
>
> When it is realized that selection of the employee is in reality a prediction of his future job behavior, the difficulties and the complexity of the selection problem loom even larger. To aid him in this task, the employer may resort to a number of devices, such as:
> 1. the applicant's personal record,
> 2. the interview,
> 3. the physical examination
> 4. vocational ability and general aptitude tests,
> 5. personal references.[1]

Certainly we will agree that this problem of selection is a complex one and one that is not easy to solve. No doubt, it is the very complexity of the problem (which is the problem of prognosis) that is the reason why so little has been

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[1] Joint Committee Report. Vocational Ability Testing from the Standpoint of the Employer. E.C.T.A. Tenth Yearbook, Somerset Press, Inc., Somerville, N. J. p. 57.

accomplished. If it were possible to use any one of the five devices mentioned above, for example, the vocational ability and general aptitude tests, and arrive at a fair conclusion of the success or failure of a student or employee, probably there would not be such a meagre amount of prognostic material. However, everyone knows that when it is a human being that is to be tested, consideration must be given to him as an individual made up of many complex parts and it is the whole and not the parts alone that characterize his success in life. It may be asking a great deal for education to produce one prognostic test that would comprise all these, or similar, factors; perhaps it is an impossibility. But is it necessary to have these parts all written sub-tests of one comprehensive prognostic test? Is it not possible that part of these tests should be analyses of personal records, personality rating scales and the test of an oral interview? Because formal, written, standardized tests are flooding the market, we must not forget that though these give us very objective criteria, they do not solve every problem. Again, perhaps, an individual's future success or failure may not be entirely predictable by formal, written testing material.

It is a fairly well established fact that the subject of trade tests and psychological tests is not new nor unknown in management. A fair criterion of employer reaction to their value is the extent to which they have been generally adopted in business enterprises. The case for the use of aptitude

and vocational tests is not so firmly established, but it is believed that interest in their use is perhaps rising. Some businesses are slow in adopting what they term a "new fad" and to many businesses, aptitude and vocational testing is just that.

> The grafting of new skin on a sore spot is not easy for patient or doctor and time is required for the healing. The grafting of the proposed testing set-up on industry is not going to be simple, even though the operating is for the improvement of industry's major sore spot, the "patient" will complain; it will take much time for the experiment to attain any degree of the success desired.[1]

In an address presented at the first general meeting of the Department of Business Education, Milwaukee, Wisconsin, July 1, 1940, Mr. Elliot, Vice-President of the Studebaker Corporation, whose interest in our field is obvious, presents the businessman's point of view relative to closer collaboration between business and business education. In referring to the complaint of most businessmen that the high school graduate is not equipped to take his place in the business world, Mr. Elliot uses a defensive argument in favor of the school:

> I have been told by at least one high school principal, in reply to the charge of incompetence on the part of some graduates, that it was due, at least in part, to the fact that they were unable to control the selection of the classes. There

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[1] Holdridge, Dennison Manufacturing Company. "Comments on Testing Prospective Office Workers." Guidance in Business Education. E.C.T.A. Ninth Yearbook, Somerset Press, Inc., Somerville, N. J., 1936.

> must be other imponderables which prevent the kind of selectivity which keep out of business courses and business schools the less qualified students. Perhaps it is one of our democratic freedoms which we are not willing to curtail that every individual should have the right to take whatever course he sets his heart upon. Nevertheless, I expect you would join me in a wistful glance at the possibilities of a much more selective process of admission to commercial studies and courses in business than is now generally practiced.[1]

This lack of a selective process in the schools is likewise observable in business remarks Mr. Elliot. "...business, from a selfish viewpoint, has suffered in the past from its own indifference, inability, or lack of knowledge, with respect to the selection of employees, determination of their aptitudes and the matching of aptitudes with jobs."[2]

In his desire for closer collaboration between business and business education, Mr. Elliot urges a joint responsibility so that together we can explore some of our problems and determine where the opportunities for improvement lie.

> These opportunities, it seems to me, are primarily in the following areas:
> 1. Defining our aims and objectives of business education and establishing the requirements of business training;
> 2. Determining aptitudes and applying the results of what we determine;
> 3. Proving the processes of selectivity;

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[1] Elliot, K. B. "How Business and Business Education Can Collaborate for Better Business Training." National Business Education Quarterly. Fall, 1940.

[2] *Ibid*.

4. Retracing our steps somewhat to study the problem of the individual of ordinary ability.[1]

There is no mistaking the emphasis Mr. Elliot places upon aptitudes and aptitude testing. He believes firmly that aptitudes should be determined and that this determination would be a boon to all.

> I consider our uncritical attitude toward the matter of aptitudes one count on which we both (business and business education) can be successfully indicted. However, the graver charge in my estimation lies against business management in this connection rather than against the schools. I happen to believe that the greatest disservice you can do to an employee is to fail to determine as fully as possible and as early as possible the kind of work for which he is best suited. In my judgment, not only an individual's success, but his happiness depends upon the opportunities he has for giving expression to his stronger aptitudes. It is my firm conviction that men and women are every day sacrificing both their opportunities for business success and their chances for personal happiness because of the fact that they are doing the wrong kind of work.[2]

It is rather unusual to have a person carry the possibilities of aptitude testing as far as Mr. Elliot does when he says that he thinks every employee should insist that he or she be given a comprehensive and competent aptitude test and should demand that as far as possible his work be assigned in accordance with the results thereof. When we have educated our students and prospective employees to the extent that

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[1] Ibid.

[2] Ibid.

they insist upon a test being given them to help determine their future work, surely then we will not count the years lost that we have spent in trying to justify prognosis.

As was stated earlier, the term "prognosis" or "prognostic testing" will not be used by many persons in their interpretation of the factors that will go towards greater selectivity of students for business courses. They will stress guidance as being the one means of remedying any future failure. Partially, this is true; but before one can guide another, he must know where he intends to go and if he is prepared not only to enter upon the road but to successfully complete the journey. In speaking of guidance programs, the prognostic element will be given greater emphasis in this paper.

Referring to the importance of vocational guidance as a means of serving the individual and the business world, the school must recognize that it is especially in the commercial department where such large numbers are enrolled that special attention must be given. We must take into consideration not only the betterment of the student, but also the effect his right choice will have upon society.

> Vocational guidance in commercial education has more important social implications than it has in other fields. A pupil may be advised against his desire rather than in accordance with it for several reasons. For one thing, individual choice is not always dependable. A girl may choose a stenographic job because of the social approval of it rather than

> because of her personal interest in it. If the market for a particular type of commercial work is flooded--stenographic for example--a pupil of doubtful ability should not be permitted to enter it and thus increase the oversupply. The vocational choice of each individual is one of grave importance to himself and to society, as it materially affects the whole economic structure of the nation.[1]

Continuing this same thought as to the social implications of business training and answering the objection that the use of selective methods is undemocratic, Frank C. Phillips, Director of Business Education in Medford, Massachusetts, tries to present a truer view. He says that those who advance such objections have a mistaken notion as to what equality in a democracy really means.

> In a democracy, equality in education does not mean that we must offer each and every pupil the same kind and the same quantity of work. Education is not a leveling process that would reduce everyone, regardless of ability, to the same level of achievement. In a democracy, equality in education means equality of opportunity--opportunity for each pupil to develop to the limit of his capacity in the direction in which his interests and aptitudes naturally lead him.
>
> We have become so accustomed to the psychological approach to educational problems that we are likely to overemphasize individual rights and to forget that the public as a whole has rights that are equally important. Recently there has been a tendency to cater too much to the whims and desires of individuals that are not based necessarily upon the needs and capacities of these individuals. There is nothing progressive about education that attempts to make an opera singer

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[1] Conwell. op. cit.

> out of a man who has no voice, nor that attempts to make a stenographer out of a girl whose motor reaction is sluggish and whose English background is so deficient that she will not be capable of comprehending more than half of what she hears or of meeting reasonable requirements as to spelling, punctuation, and English construction.[1]

That there is a need for exploration to discover interests and aptitudes before entrance into business courses is recognized by leading educators. The New York Committee in one of their latest reports deplores the fact that too many of our secondary school students who set out to prepare for the positions of stenographer and bookkeeper never attain employable standards. They recognize this as being caused by an oversupply of mediocre and poor stenographers and bookkeepers which is greater than the demand, and the complaint of businessmen that our graduates do not meet their standards and requirements.

> Until recently, little attention was paid to the problem of the low-ability student who continued to fail, or for whom standards were lowered so that promotion was possible in a field in which he did not belong. Many of our secondary school students do not have the mental ability nor the powers of concentration and reflective thinking necessary for success in advanced bookkeeping and secretarial work and nothing is done to separate these boys and girls into groups that will meet their abilities and prepare them for the jobs that they can do most successfully. Prognostic tests, aptitude tests, diagnostic tests,

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[1] Phillips, Frank C. "Ability Grouping as a Factor of Guidance in Curriculum Selection." Business Education for Tomorrow. E.C.T.A. Fourteenth Yearbook, Somerset Press, Inc., Somerville, N. J., 1941.

> achievement tests, a study of I.Q. ratings, previous records, occupational information, etc., must be incorporated in the program if the selective and guidance process is to produce the hoped-for results.[1]

It is likewise urged by this Committee that business standards be incorporated into school courses and thus these standards would keep poorer students out of advanced classes where the aim is to produce a high quality of efficiency not attainable by low-ability students. This is indeed a problem that must receive the careful attention of educators.

Another angle of the loss sustained by trying to train students for vocational jobs for which they are not fitted is that presented by Donald Beckley, formerly of the Rochester Institute of Technology, who illustrates the effect of placing poor or mediocre graduates.

> ..... a more serious effort may be made to find a job for students that their potentialities might seem to justify. Just as a manufacturer cannot afford to turn out inferior merchandise if he is to hold his customers, a school cannot turn out poorly equipped students if it expects to have employers continue to be willing to hire them. Employers, like consumers, have long memories and a placement failure may result not only in the discharge of the student concerned, but may carry over into the school's later relationships with the employer.[2]

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[1] New York Committee. Business Education for Tomorrow. E.C.T.A. Fourteenth Yearbook, Somerset Press, Inc., Somerville, N. J., 1941. p. 35.

[2] Beckley, Donald K. "Improving Job Coordination in Business Education." Journal of Business Education, September, 1944. p. 13.

Summing up the opinions of employers, educators and society in general, our investigation may seem to reveal many conflicting points of view as to the advisability of greater selectivity through the medium of prognostic testing. Some oppose it, others are in favor of it, still others form indifferent neutrals. There do seem to be some definite conclusions, however, that perhaps all will agree upon to some extent.

1. Few employers will engage and retain one to do stenographic work who has not a good mastery of a shorthand system, a certain degree of skill in taking dictation, and ability to get out a fair amount of usable transcription in a working day.

2. Few will employ and retain a clerk to do dictating machine transcribing whose typing ability, spelling ability, knowledge of grammar, working vocabulary, and operating skill are too poor to justify the wage paid.

3. Few employers will employ and retain a clerk to do general typing who cannot turn out a reasonable amount of typed work in a working day.

4. Belief in the quite generally accepted theory of individual differences leads the committee to conclude that in every commercial department are young people who are better adapted to some of the newer types of office work than they are to the three traditional types which have dominated the offerings of our schools since vocational business training was first offered four score or more years ago.[1]

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[1] Joint Committee Report. "Final Vocational Stenographic Tests." Measuring for Vocational Ability in the Field of Business Education. E.C.T.A. Tenth Yearbook, Somerset Press, Inc., Somerville, N. J. p. 57.

If business education is going to meet these standards set up by business, and, after all, that is one of the primary purposes of business education, it is imperative that we cease trying to train low-ability groups for high-standard positions in which they will never succeed. Rather, let us direct our youth by ascertaining their interests, aptitudes and abilities by means of prognostic measures into those channels of instruction which will fit them to earn a living and to live happily in this economic world.

Has anything been done in the past towards furthering prognostic testing as a means of selection for business courses? Research in this field was quite current in the 1920's and 1930's, but there seems to have been a loss of enthusiasm during the past decade. There may be many causes for this falling off. Perhaps, the chief effect was due to the emergency period when employers were forced to take whatever the schools had to offer and the schools were forced to train whatever type of student they had, regardless of potentialities. Another reason for a decline in prognostic research may be due to the almost complete failure of any measuring instrument to predict with any degree of certainty the interests, aptitudes and abilities which those who administered the tests wished to measure. However, it would be unfair to say that the attempts that have been made have proved wholly unsatisfactory. We must, therefore, push on,

perhaps analyze why these studies have not fulfilled their objectives and profit by the mistakes of others to further the important work of prognosis. Let us at this point review briefly some of the attempts made in prognostic research.

Rogers[1] administered ten psychological tests, which measure the speed of mental functions or processes, to forty-five students of typewriting and shorthand in the Extension Department of Columbia University. Correlations with stenographic marks, which were the criterion of success in the study of shorthand, ranged from .07 on the number-checking test to .46 on the hard directions test. Certain team correlations with stenographic marks ranged from .40 to .63. A correlation of .53 was found to exist between all the tests and the grammar criterion. Rogers felt that this method of 'empirical vocational tests' gave a far more reliable criterion for vocational guidance in the field of stenography than had ever been attained by any other method. He suggested that a much larger group of subjects and additional tests be used and that experimental conditions be improved.

Bills[2] conducted an investigation in a technical high school to find the relationship between efficiency in a

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[1] Rogers, H. W. "Psychological Tests for Stenographers and Typists." Journal of Applied Psychology 1:268-274, 1917.

[2] Bills, M. A. "A Test for Use in the Selection of Stenographers." Journal of Applied Psychology 5:275-283, 1921.

battery of tests and success in a stenographic course, as determined by the recommendations of teachers after five months of observation of girls being trained as stenographers. Eighty students took the tests. No correlations were reported. Critical scores were the fundamental consideration. The following conclusions were reached:

1. A battery of tests is more effective both in eliminating failures and in picking successes, than any single test.
2. Of the single tests, General Intelligence is the most efficient for eliminating failures.
3. Of single tests, the Special Ability test is most efficient for selecting successes.
4. Failures can be predicted by the tests with over 85% accuracy.
5. Successful stenographers can be selected.

Toops[1] devised thirty-two tests that cover a variety of material and administered them to thirty-seven students in a business college for the purpose of predicting the capacity to progress in stenography, typing, and bookkeeping. The criterion of success in stenography was arbitrarily defined. A correlation of .71 was found between a combination of ten selected tests and the shorthand criterion for this group.

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[1] Toops, Herbert A. "Tests for Vocational Guidance of Children Thirteen to Sixteen." Contributions to Education, No. 136. New York, Teachers College, Columbia University, 1923. p. 63-99.

Ohmann[1] administered ten tests to 225 students who were enrolled in classes that ranged from the second to the sixth semester of stenographic training. The results were correlated with an objective criterion test of stenographic skill, which consisted of dictation and transcription of a business letter. The resulting zero-order correlations were low, .06 to .37.

Though the correlations were very low, Ohmann felt that some good had come out of the administration of these tests. He says:

> While these tests should not be regarded as an entirely satisfactory and thoroughly defensible basis of prognosis, they do seem to hold some promise.
>
> .....In conclusion then it may be said that there seems to be a rather lively prospect of building tests which will furnish a basis of prediction in stenography, and that the tests used in this study--although not satisfactory as yet--point the way to the development of such a prognostic test.[2]

Limp[3] administered a series of forty psychological group tests to first year students after one week of instruction in shorthand and typewriting in high school for the purpose of selecting from this number of tests a battery which would predict the aptitudes and abilities of high school freshmen

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[1] Ohmann, O. A. "The Possibility of Prognosis in Stenography." Research Studies in Commercial Education, University of Iowa, 1:36-41, 1926.

[2] Ibid.

[3] Limp, Charles E. "A Work in Commercial Prognosis." Journal of Educational Research, 16:48-56, 1927.

to learn stenography. Correlations between the tests and the shorthand criterion for 107 students range from .00 for coordination of reaction to .53 for recognition spelling. After the zero-order correlations had been found for the entire group of tests, six tests were selected for further investigation, and a correlation of .61 was found to exist between the criterion scores and the predicted scores.

Beals[1] found a correlation of .36 between I.Q. and averaged marks for the first term in stenography for 338 girls in Julia Richman High School in New York City, and a correlation of .34 between I.Q. and averaged marks received for two terms of stenography for 324 of these girls.

Blanchard[2] reports an investigation carried on in twenty-six cities in the United States. Scores were obtained for 1,239 beginning students in Gregg shorthand. The correlation between the scores on the Hoke Prognostic Test of Stenographic Ability and the scores on the Rollinson Diagnostic Shorthand Test on Lesson 4 of Gregg shorthand was .23. The correlation between the Hoke Prognostic Test of Stenographic Ability and the final semester grades was .24.

In another investigation in which the Hoke Prognostic

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[1] Beals, Sarita. "Correlation Between Marks and I.Q.'s of High School Students." New York City Bulletin of High Points, 10:22-32, April, 1928.

[2] Blanchard, Clyde Insley. "Results of the Hoke-Rollinson Research Study." American Shorthand Teacher, Vol. IX.

Test of Stenographic Ability and shorthand achievement tests were administered to thirty-nine students in a Los Angeles high school Jessup[1] reports that the correlation of the total scores of the Hoke test with the achievement tests did not seem to forecast ability in shorthand.

In Woods' investigation[2] a battery of tests was given to different groups of college students from 1925 to 1927. The criterion of success for the first group was shorthand marks, and the criterion for the 1926-1927 group of one hundred students was an original test of eight hundred words in dictation and transcription and instructors' grades. According to Wood, the original test was not entirely satisfactory.

McLaughlin[3] gave a battery of unstandardized tests to thirty stenographers. The scores were correlated with employers' efficiency ratings. Low correlations between the various parts of the test show the failure of each part separately to measure stenographic ability, but a multiple correlation of .73 was found in comparing the employers' ratings

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[1] Jessup, E. M. "The Application of Prognostic and Achievement Test in Shorthand." Journal of Commercial Education. Vol. 57, June, 1928.

[2] Wood, Ethel H. "An Experiment with Predictive Tests in Shorthand." Journal of Commercial Education, 57:298, 1928.

[3] McLaughlin, Mary. "A Proposed Objective Battery Test for Shorthand." Research Studies in Commercial Education, University of Iowa, 4:95-106, 1929.

with the scores for the five tests. McLaughlin also gave the tests to 250 fourth-semester shorthand students who were finishing the high school course. The differences between the scores of the stenographers and the high school students are indicated in the following figures:

| | Stenographers | Students |
|---|---|---|
| Arithmetic mean | 113.2 | 81.78 |
| Standard deviation | 16.6 | 25.23 |
| Range of scores | 61-139 | 27-134 |

Worley[1] made a study of 536 graduates from the Langley High School, Pittsburgh, Pennsylvania, to determine how well shorthand marks as given can be predicted from other marks as given and from I.Q. The correlations of the marks in modern languages headed the list, while the correlation of I.Q. with the shorthand marks fell near the end.

In evaluating this study, Blackstone states that "the number of cases included in the study is fairly large, so that the reliability should be high. The reliability of the study is probably limited to marks as given by teachers, and does not apply to actual success in stenography on the job."[2]

An attempt was made in the Packard School of New York City to determine the extent to which standard instruments may be

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[1] Worley, Raymond J. "Prognosis in Shorthand." Journal of Business Education, 6:15-16, 1931.

[2] Blackstone, E. G. "Commercial Education Research Abstracts." Business Education World, 14:507, 1934.

used in predicting success of students enrolled in the secretarial course. The criterion of success used in this investigation was the actual completion of the course in shorthand in the school. Whitley[1] reported that the scores of the graduates on the Hoke test revealed that no student who made a score of less than 370 was graduated from the course.

Sandy[2] summarized five shorthand studies, involving 1,123 cases, and found correlations between intelligence and shorthand ranging from .22 to .46, with an average of .35. This average correlation is not dependable for predicting school success in shorthand training.

Duncan[3] found a correlation of .74 between tenth-grade English and eleventh-grade shorthand theory ratings of 108 students, a correlation of .59 between ninth-grade English and the shorthand criterion, and a correlation of .49 between I.Q. and the shorthand criterion. Even with these relatively high correlations, Duncan suggests that caution be observed in recommending this battery of subjects for use in prediction

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[1] Whitley, Sara S. "Predicting Stenographic Success Through Prognostic Tests." Balance Sheet, 13:242-244, 1932.

[2] Sandy, Forrest M. "A Critical Examination of Research Dealing with the Intelligence of Secondary-School Commercial Students." Master's Thesis. University of Iowa, 1932.

[3] Duncan, Margaret E. "Prognostic Testing in Shorthand." Journal of Business Education, 12:15-16, 1936.

of shorthand ability, because of irrelevant factors such as the human element, subjectivity of grading, and unreliable instruments of measurement.

Educators are quite universal in the belief that a large part of the disagreement among the results obtained by different investigators in the field of shorthand prognosis is accounted for by the statistical unreliability of the shorthand criteria.

According to Symonds, one of the greatest factors operating to destroy the relationship is unreliability of school marks, and that until some better criterion is secured, we shall not be able to use tests as prognostic instruments.

> Studies of the predictive value of tests are of comparatively little value when the criterion--measure of achievement--is worthless. Until it is possible to secure accurate measures of the results of education, it is of little avail to attempt to improve aptitude tests and guidance methods.[1]

In a review of 30 studies in shorthand prognosis, Paul L. Turse[2] pointed out that 11, or more than one-third of this number, were finally concerned with less than 100 cases for experimentation. He feels that these studies are typical of the experimental effort to date, and that any conclusions

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[1] Symonds, Percival M. "Tests and Interest Questionnaire in the Guidance of High School Boys." The Measurement of Business Education. Monograph 18. New York, South-Western Publishing Company, 1930. p. 47-48.

[2] Turse, Paul L. "The Status of Research in Shorthand Prognosis." The National Business Education Quarterly, 1943.

drawn from the results of such studies must be regarded with extreme caution. It is quite well known that correlation coefficients are more dependable when the sampling is sufficiently large to lessen the chance factor. Turse's opinion of the studies in prognosis is that Blanchard's experiment[1] in 1928 is probably one of the best up to that date. He comments upon it as follows:

> One of the most comprehensive prognostic experiments, as far as number of cases is concerned, was made by Blanchard in 1928. Had the experiment continued longer than one semester so that a measure of transcribing skill could have been secured as an alternate criterion, this study might have been one of the most authoritative in the field. .....This finding was a significant contribution in that it also suggested the probable inadequacy of short training periods as suitable criteria for shorthand prognosis.[2]

So much stress is placed on the degree of correlation which the prognostic test must have with its criterion that it may lead us to think that any test which shows low correlation will give no conclusive evidence of its value. However, in his article, "The Status of Research in Shorthand Prognosis," Turse endeavors to enlighten us on this score.

> It develops from statistical evidence that the true validity of any aptitude measure is practically always superior to that indicated by the raw correlation with achievement.

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[1] Blanchard, C. I. "Results of Hoke-Rollingson Research Study." Business Education World, April, 1934.

[2] Turse. op. cit.

> From this fact, considerable promise can be held for the future of shorthand prognosis.[1]

It is also necessary to keep in mind the purpose or the use of the test when interpreting coefficients of correlation, as pointed out by Hull:

> Tests showing somewhat lower correlations than .50 may be used in selecting individuals for a given purpose such as an employment testing or university entrance examinations, where considerable numbers of individuals falling below an arbitrary critical test score may be reflected. In general, the higher the percentage of rejections that is permitted, the lower the useful correlations. . . . . This would, of course, involve the rejection of many fairly good students along with the very weak ones. But in employment work and in certain universities where large numbers of applicants must be turned away in any case, this works no particular hardship to the individual and yet results in a distinctly superior level of aptitude among those individuals finally selected.[2]

There is hardly any denial that the similarity to shorthand admission to the employment and university admission situations referred to by Hull is very close. It is also evident that the purpose of a shorthand aptitude test is primarily to eliminate those who are unfit to pursue the study of shorthand and not to predict with a high degree of accuracy, the relative standing of those who continue the study. Considered from this point of view the distinct

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[1] Ibid.

[2] Hull, C. L. Aptitude Testing. Yonkers-on-Hudson, New York World Book Company. 1928.

usefulness of a shorthand aptitude test correlating as much as .60 with achievement should be apparent.

Sherman[1] in his study of prognosis in shorthand had for his primary purpose to discover those students who would fail the first or second semester of shorthand. He chose factors used frequently in other phases of everyday life. His theory was that to find success in shorthand writing, there was only one factor to be considered for success in a comparable field and that was ordinary longhand writing; for shorthand reading, the comparable factor was longhand reading, etc. In his analysis of all the apparent activities indulged in by students of shorthand, he found that ten factors were the nearest to a counterpart of the students' activities that could be found. Their relationship seemed a probable answer to discovering an index to shorthand success.

The idea of trying to find a relationship between shorthand success and success in any other subject seems to yield only moderate results. Could it be due to the fact that we are leaving out the personal factors of the individual which hinge so closely upon success? Aptitude, ability, success in past studies, expert teaching, unaccompanied by strong personality and character traits, may indicate possibilities of success; but in the final analysis unless these qualities

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[1] Sherman, Marsdon A. "A Study of Prognosis in Shorthand." Business Education World, 22:696.

are present, the outcome will be doubtful.

Perhaps one of the most successful prognostic experiments was that of Eyster[1] who made a composite test of five items which yielded quite accurate predictions. His combination of tests included: (1) mental rating; (2) average English grades while pupils had been in high school before taking shorthand; (3) average of all high school grades excluding English; (4) score on the Hoke Prognostic Test of Stenographic Ability; and (5) subjective trait rating.

His results were quoted: During five years period, 109 pupils took shorthand in spite of prediction of failures; 100% failed. Of the 370 pupils approved for shorthand, 24% failed; of the 138 marked as having a 50-50 chance, 49.2% failed.

In commenting on this study, Leslie says:

> These figures are characteristic of a good prognostic instrument. The top and bottom groups were picked almost perfectly. The doubtful middle group was clearly marked and with special remedial work many of that doubtful group could have been salvaged.[2]

And Sherman referring to Eyster's report adds that he believes "the success which Eyster found in his study hinged strongly on the section under 'Personality Trait Rating' in

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[1] Eyster, Elvin S. "Prognosis of School Success in Shorthand." National Business Quarterly, 7:31-4, 1938.

[2] Leslie, Louis A. "Shorthand Prognosis." Business Education World, February, March, 1947.

which the work habits, character, and personality of the students were evaluated."[1]

That there are no really good prognostic instruments in standardized form has been generally concluded and that there is a need for such measurement is undeniable. Schools, however, are not sitting back waiting for such a test. Realizing that some criterion must be used for determining who will be included in the stenographic groups, it may be ventured that practically every secondary high school of a size to offer several different courses has devised some sort of testing instrument, and perhaps it may not be rash to say that many of these instruments have proved highly predictable.

The public high schools of Baltimore, Maryland, are fortunate in having a well qualified and modern bureau of tests and measurement, whose services are constantly available to any school desiring to use them. In recent years, the general use of aptitude tests as a basis for course and subject selection in the senior high school has become quite popular. Relative to this testing movement, Mr. Hyde, Supervisor of Business Education in Baltimore, attempted to improve through a departmental committee the course selection situation in an attempt to eliminate to some degree unwise course selection. He briefly explains some of the features of the committee movement:

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[1] Sherman. op. cit.

> At first the committee combined the factors of achievement, I.Q., and reading ability as a basis for selection. The results seemed to indicate that this combination was a wise choice. During the school year 1940-1941 we added to the criteria a formal aptitude test to determine stenographic and clerical ability.[1]

Realizing that in the problem of guiding students into the proper courses, it is often more difficult to educate the parent to the advisability of such direction than to convince the child, Mr. Hyde recommends frequent contacts with the home through direct correspondence with the parents. Of special interest is the letter used to acquaint the parents of the necessity of proper course selection.

Mr. Hyde concludes his report by stressing the importance of follow-up work after the initial testing program has been put into effect.

> I wish to place particular emphasis upon the need for follow-up, because failure to follow through any case defeats the whole purpose of course selection. No matter how careful one may be in selecting the criteria upon which he bases his recommendations, the only real validation of that criteria lies in the ultimate success of those who have been guided by it. As far as course selection is concerned, then, we may summarize by saying that evidence seems to point toward the use of achievement, I.Q., reading ability, and aptitude tests as a valid basis for the selection of courses in commercial work by pupils completing the tenth grade; and that follow-up, in the case of every pupil is just as important as the original selection.[2]

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[1] Hyde, E. Duncan. "Guidance, A Commercial Department Function." Balance Sheet. March, 1942. p. 295.

[2] Ibid.

Other high schools are no doubt following a prognostic program similar to that of Bay Ridge High School, New York.

> For years it was customary to select pupils for shorthand at Bay Ridge High School. Pupils with 75% or better in English were admitted without examination. Pupils with 70% in English were required to pass an English examination based on the Tressler Minimum Essential Test. Pupils with an English mark below 70% were required to postpone the study of shorthand until they achieved an English mark of 70% or above.[1]

There can be no question of the importance of English as a criterion for a stenographic course. Educators cannot ignore the complaint of personnel directors, supervisors and employers that high school graduates are deficient in the mechanics of English usage. In order to discover the specific elements of the mechanics of English usage in which high-school graduates are deficient and in which secretaries have a usable knowledge, Dr. Velma Abney gave tests to 150 secretaries whose English usage employers felt was unsatisfactory and to 200 students still enrolled in high school. When the tests were scored and the data tabulated, it was found that a large percentage of high school students were badly handicapped by poor English.

> The differences in scores made by secretaries and students were so great that their significance statistically is unquestioned. For example, the mean score for the secretarial group was around

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[1] Potter, Thelma M. An Analysis of the Work of General Clerical Employees. Contributions to Education, No. 903. New York, Teachers College, Columbia University, 1944. 110 p.

> 850, while the mean score for the students was 700 or a difference between the means of 150 points, the significance of this difference being indicated by a critical ratio of 24.52. To delineate more sharply the amount of overlapping of the curves depicted the two groups, it should be kept in mind that only four students, or two per cent, exceed the mean or average score (852) of the secretaries.[1]

English then needs special emphasis in our high schools and particularly so for our stenographic majors. It is also thought that foreign language marks are a good criteria. Leola Spellman[2] head of the commercial department of the Ponca City (Oklahoma) High School, in a study to ascertain whether there was any significant correlation between shorthand grades and grades in certain academic subjects of college students, found the highest correlation of .46 between shorthand achievement and marks in foreign language. Other investigators have made similar discoveries. Spellman believes that there must be present in both many factors that are similar in the learning process. The most reasonable explanation for this higher correlation seems to lie in the fact that foreign language and shorthand are very largely language subjects, both requiring the mastery of new symbols and word forms.

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[1] Abney, Velma O. "Basic Minimum Essentials of Mechanics of English Usage Required by Secretaries." Doctor's Dissertation. School of Education, University of Southern California, 1943.

[2] Spellman, Leola B. "A Statistical Analysis of Shorthand Grades as Related to Grades in Academic Subjects on the College Level." Master's Thesis. School of Commerce, Oklahoma Agricultural and Mechanical College, 1945.

One of the most exhaustive studies of recent years dealing with shorthand prognosis is that made by Dr. Agnes Osborne in 1943 on the relationship between certain psychological tests and shorthand achievement. She defends the purpose of her study by saying:

> This study was projected because educators are displaying an increasing interest in the problem of prognosis in the field of shorthand, owing to the large percentage of students who fail in each semester's work and to the increased enrollments in the subject.
>
> The recognition of the need for guidance through prognosis is reflected in articles that are appearing with great frequency in professional magazines.
>
> .....Experimental studies that deal with selection of students have been made in some school systems, and it is reported that pupils, parents and administrators have reacted favorably to the results.
>
> .....The few studies that have been made with respect to prognosis in the field of shorthand reveal that no adequate single test or battery of tests predicts success.[1]

Dr. Osborne's study attempted to find a group of tests which would give a much higher prediction than has been reported in previous studies, inasmuch as improved standards for measuring shorthand achievement now make possible a more accurate study of the problem of prognosis.

In the investigation, Dr. Osborne chose four of the five

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[1] Osborne, Agnes E. The Relationship Between Certain Psychological Tests and Shorthand Achievement. Contributions to Education. New York, Teachers College, Columbia University, 1943.

public day high schools in Newark, New Jersey. Students enrolled in the second semester of shorthand were chosen, as the first semester, for the most part, covers only the introductory ideas of the subject. She remarks the favorable conditions under which the investigation was carried on--the cooperation of the administration of the schools, and the uniformity in the use of shorthand textbooks, in shorthand teaching procedures and in record-keeping throughout the city. (It is interesting to note that the "manual" method of teaching shorthand is used consistently in each school.) The number of students included in the final analysis totaled 139, some having to be eliminated for various reasons.

A Shorthand Learning Test was used to determine group differences and the results showed that the students were arrayed from very low to very high in an order that approaches a normal distribution. The reliability of the Shorthand Learning Test, which was used as the criterion of shorthand achievement in this study is exceptionally high. The mean reliability for the four shorthand subtests (dictation, brief forms and phrases, reading, and transcription) as determined by the examiner was .91. The validity of the test is assured. The high intercorrelations among the total scores of the Shorthand Learning Test and the four subtests suggests that the total score on the Shorthand Learning Test is the best indication of shorthand ability that we have, and that there would be small merit in trying to predict any of the

subtest scores.

The results of Dr. Osborne's study showed that the zero-order correlations of the complete psychological test scores with the shorthand criterion were low, the highest being with the Otis Self-Administering Test of Mental Ability. The relationship of the Iowa Silent Reading Tests and the I.E.R. General Clerical Test to shorthand achievement was practically the same as that of the Otis Self-Administering Tests (r .3577 and .3757 respectively). The zero-order correlation of the Revised Minnesota Paper Form Board Test with the shorthand criterion was the lowest of the complete test series (r .0754). A comparatively low correlation existed between the Gates Visual Perception Tests and the shorthand criterion (r .0905). The coefficient of multiple correlation (r .4343) indicated that the combination of the six complete psychological test scores and the chronological age does not form a basis for prediction of success in shorthand.

Dr. Osborne's final conclusion formed from the analysis of the data in her study was that "none of the correlations between the shorthand criterion and single tests or between the criterion and combinations of tests is high enough to make prediction valuable except in the negative sense."[1]

In summing up this chapter on previous findings in the field of prognosis, we can only reiterate the statement that

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[1] *Ibid.*

has been made so many times and which should be the common knowledge of every business teacher--no single test or battery of tests has yet been devised that will predict a student's success in learning the skill subjects of the business curriculum, or in holding an office position involving those skills after they have been learned.

Answering the questions: Is there, then, any value in the tremendous amount of research effort expended in attempts to find predictive measures for business subjects? Have these efforts resulted in any measuring instruments that have special value for guidance in the business curriculum? Mathilde Hardaway throws a favorable interpretation on the situation by responding, "Yes, despite the published opinion of some prophets of gloom. The few moderately successful efforts and the many failures to find measures that relate to achievement in the skill subjects very likely have pointed the way to a greater degree of success in the future."[1]

She remarks that the zero relationships have been valuable in at least eliminating some possibilities that scarcely need be explored further and in exposing the inadequacies of the criteria commonly used as measures of success: teachers' marks on one or two semesters of the course in which success was predicted; theory tests in shorthand, etc.

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[1] Hardaway, Mathilde. "Prognostic or Aptitude Tests for Skill Subjects." Business Education World, April, May, 1945.

Miss Hardaway believes that perhaps the greatest weakness of most of the prognostic studies is that the measures of success have been taken after too short a period of study and also that the predictive measures have often been applied after the students began the study of the course. She emphasizes the need for more extended researches that gather the predictive measures before the skill subjects are studied and carry the students through the completion of their business courses and on into employment. "Combination of several factors hold the most promising possibilities for a sound basis for guidance. .....common sense will go a long way toward making judgments with the help of these tools."[1] When this combination of testing factors plus common sense is effected, then and only then may we look for a sound prognostic instrument for measuring shorthand achievement.

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[1] _Ibid_. May, 1945.

# CHAPTER III

## METHOD OF SECURING DATA

Up to this point in our study it has been shown from reports of competent authority that there are a great number of shorthand failures among the students of our business curriculum either in their first year of this subject or in their final grade. It is also evident that many of those who are given a diploma from the business curriculum have just managed to receive a passing grade and should not be recommended for stenographic positions.

Because of the demoralizing effect that the sense of failure has upon the individual; the waste of time, money, and energy expended by the school; the dissatisfaction generally felt among employers; and the injustice rendered to society at large; an effort has been made to point out the wisdom for greater selectivity of students for the shorthand course. This conclusion was given weight by documenting as far as was possible and practicable the experiments and research work of experts and specialists in the field of shorthand prognosis and vocational guidance. Although we are forced to concede that among the several studies that have been made in these two areas there are but few moderately successful efforts and many failures, business educators are optimistic enough to see in these very failures the start toward greater success in the future.

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In this spirit of optimism and in the firm conviction that prognostic testing is the solution of many failure problems, this study will approach the question of prognosis from a different angle. To date, emphasis has been placed upon prognosis as a guage for measuring probable success in shorthand, and all studies have been based upon the early learning stages of this subject. This research will include two groups of stenographic students: (1) Superior students who have completed the usual two-year stenographic course with a final average of A; (2) Students who have either failed outright or have managed to finish the course with a D grade and therefore are not recommendable for stenographic or secretarial positions. In order to insure a greater degree of reliability, the records of the graduates of Seton High School for the past five years, 1943 to 1947 inclusive, will be used.

Before going into a detailed report of the procedures used, it may be interesting and helpful to the reader if he is acquainted with the high school in which the study was made and with the program of studies followed by the students upon whom this report rests.

Seton High School, the first Catholic central high school for girls in the city of Baltimore, was founded in 1926, by His Excellency, the last Most Reverend Michael J. Curley, D.D. Archbishop of Baltimore and Washington.

Seton was named in honor of Mother Elizabeth Ann Seton, foundress of the parochial school system in the United States. Mother Seton's spiritual daughters, the Sisters of Charity of Saint Vincent de Paul, direct the school which is organized for the ninth,tenth, eleventh, and twelfth grades.

In 1926, the Department of Education of Maryland, approved Seton as a first-group high school. The classification was confirmed by the Commission on Secondary Schools of the Middle States Association of Colleges and Secondary Schools in 1930. Again in 1940 Seton was evaluated under the new standards set up for secondary schools by the Middle States Association. A superior rating was accorded as a result of this study.

At its inception, in 1926, Seton had an enrollment of 259 pupils, a faculty of 16 teachers, and at the close of the year graduated a class of 13 seniors. In recent years the student body has numbered between 1200 and 1300, and the graduating classes between 200 and 300.

The program of studies includes units of work in Religion, English, Latin, mathematics, French, Spanish, social and natural sciences, home economics, art, physical education and commercial subjects.

Five curricula are offered: Latin-Science, Modern Classical, Academic-Commercial, General Business, and General Academic.

The Latin-Science and Modern Classical curricula are for those students who plan to continue their education beyond the high school level. The students who intend to enter colleges, schools of nursing and other professional institutions are encouraged to elect one of these curricula.

The Commercial curriculum prepares for the business world those students who intend to engage in some phase of commercial activity after graduation from high school. Attention is called to the fact that sophomores who plan to register for the Commercial curriculum must achieve a grade of C in English in order to enter the stenography classes. B is the passing grade in stenography; therefore, students must attain this grade in order to continue the study of the subject.

The General Business curriculum differs from the Commercial curriculum by omitting stenography and placing emphasis upon office practice and the use of business machines.

The General Academic curriculum offers instruction in the various subject-matter fields without laying stress upon any particular branch of knowledge.

A detailed outline of courses may be found in the appendix.

The marking system used at Seton makes use of the symbols A, B, C, D, and E to indicate the five degrees of rating.

A--indicates work very superior in quality and quantity accomplished with initiative and enthusiasm and with little help from the teacher.

B--indicates work above the average. This work would warrant the school in certifying the pupil for College Entrance or for work of equivalent excellence.

C--indicates average accomplishment. This grade may be called the qualifying mark, indicating that the pupil receiving it may wisely proceed to advanced work in the subject.

D--indicates work inferior to the average in quality, skill, and thoroughness.

E--indicates failure.

A record showing the scholastic progress of each student is filed in the office of the registrar. These records also bear the students' rank in class and the scores made in all aptitude, achievement, and other special tests administered by the school. In addition, a personality chart is prepared by the various teachers with whom the individual has had contacts during her four years of high school.

At the close of the sophomore year, students are asked to elect one of the five curricula. It is not exaggerating to say that about two-thirds of the students choose the business courses. At this juncture, those pupils who have elected the business courses are screened. They are given prognostic tests--the Turse Shorthand Aptitude Test and an

informal English test, compiled after a thorough analysis of transcription errors. This preliminary testing is for the purpose of discouraging misfits from attempting stenography and to guide them into another course wherein success will be more likely.

After the tests have been administered, scored and analyzed, the guidance counselor interviews individually those students who show low aptitude or whose English scores predicate later transcription failures and advises them to enter either the Modern Classical or the General Business courses. A letter is sent to the parents of those who were advised to change their course, and in many cases the parents are contacted personally. However, if students or parents insist upon the original choice, concession is made.

Despite the prognostic test given before entrance into the Business curriculum proper and subsequent testing carried on during the third and fourth years, there are still shorthand failures in both years and marginal students completing the fourth year. In an attempt to ascertain why this is so, the following procedures were used:

1. Records of stenographic students of the years 1943, 1944, 1945, 1946, and 1947 were consulted and pertinent data recorded.

2. Each year's records were then divided into two groups: (1) Failures and D grades of Shorthand II, (2) A grades of Shorthand II.

3. Averages were obtained in the following subjects: Latin--two years; English--

two years; geometry--one year; typewriting--two years.

4. These scores were then tabulated according to the above-mentioned grouping, and to them were added the I.Q., the general average for the four years, the class quintile in which the student graduated, records of attendance, and personality scores.

5. Analyses of the two groups were made to endeavor to ascertain the significance and relationship existing between shorthand and the four subjects chosen, and to see in what measure the other recorded information affected the final shorthand grade.

As was stated above, in order to insure greater reliability in this study, it was thought expedient to include the graduates of the Business curriculum of Seton High School for a period of five years. This would involve approximately five hundred cases. However, out of this possible five hundred, it must be remembered that in the final analysis only the superior students and the failure students were considered, the great middle group of B and C students not being studied.

The initial phase of the work entailed the consulting of the permanent record file in the registrar's office. Since this file contains every student's record who has graduated since 1926, it was necessary to separate from the entire group those containing the needed information.

As each necessary record was reached, the student's name was listed, the year of graduation, her averages in Latin, English, geometry, and typewriting, her general

average for the four years, her class quintile, I.Q., attendance record, and personality score. Each year was recorded on a separate sheet so that when the entire file was completed, we had an alphabetic list according to years. After this information was compiled, each year's records were divided into the two groups of superior students and failures. The complete data as far as was judged essential for this study then appeared in tabulated form.

The next step was, without doubt, the most important. From this complete picture of shorthand failures and successes, it was firmly desired to ascertain _why_ each student fell into his particular category. Does any relationship exist between this failure grade in shorthand and the average grade of general English? Is a foreign language grade average indicative of possible success or failure in shorthand? Can geometry be used as a spatial relation factor? Would typewriting be, perhaps, the most reliable prognostic instrument for determining final success in stenography? How do the personality factors compare with the student's record? Certainly, it would seem that in the analysis of such a representative number of students, if there is any significance or relationship between these varied factors, it will make itself evident. If there is not, it will at least show that another approach is necessary.

From this analysis it may likewise be deduced why each individual has failed. In one case, it may be a poor

English background; in another, the inability to assimilate a foreign language; a third has lost out through absence; or perhaps a low general average will show the reason for failure in stenography as well as in many other subjects. On the other hand, there may be some records that will contain absolutely no clue to the failures. The cause may be hidden under one of many variables, known only by the individual herself or in some cases by the instructor. Of necessity, these variable factors must be given due consideration.

Whether or not it will be possible to arrive at such definite conclusions for the entire group is part of the problem yet to be worked out. Where it is not too difficult to see that one student has failed because of language deficiency, it will be a greater task to show that the majority of the group failed due to the same cause. However, we will try to arrive at some percentages and from these percentages deduce some possible conclusions. The following chapter will show the records and the results obtained, while the final chapter will contain the possible conclusions.

# CHAPTER IV

## TREATMENT OF THE DATA

Working on the assumption of Mathilde Hardaway that "combinations of several factors hold the most promising possibilities for a sound basis for guidance,"[1] the program, as outlined in the previous chapter, has served as a guide; and through the comparison of several factors an attempt has been made to ascertain whether or not any noteworthy relationship exists between these several factors and the success or failure of students to master shorthand.

The data as it appears in table form is arranged as follows:

1. Total number of students included in the study.
2. Mean intelligence quotients of students in A group and D group including the years 1943 to 1947.
3. Average attendance for the five years.
4. General averages of A and D students for five years.
5. Difference between the mean of stenography and typewriting for each year.
6. Difference between the mean of stenography and the language subjects.
7. Difference between the mean of stenography and geometry.

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[1] Hardaway, Mathilde. *op. cit.*

8. Summary of yearly averages included in study.
9. Mean, standard deviation, and standard error of the mean of all subjects.
10. T tests of differences between stenography and related subjects.

The averages are based on marks attained during the students' first two years of English and Latin, one year of geometry, two years of typewriting, and the general average for the four years.* It was supposed that the two language subjects and the mathematics having been taken previous to the students' entrance into stenography might have some prognostic value in the selection of students for this course. The average for two years in typewriting, which subject is introduced concurrently with shorthand, the general average of the four years' scholastic record, the intelligence quotients, and the record of attendance had no prognostic use in this study, but were considered good comparative factors. Because it was found that the personality records on hand offered neither predictive nor comparative criteria and because the class quintile in most cases paralleled the general average, it was decided to omit both.

An analysis of the difference between the means of the subjects chosen, using stenography as the constant in each case was the method chosen to work out the statistics on this data. Before presenting the more pertinent factors,

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*See Appendix B

minor data are given in table form to serve as a basis for the comparison of the means.

TABLE I

TOTAL NUMBER OF STUDENTS INCLUDED IN STUDY

| | 1943 | 1944 | 1945 | 1946 | 1947 | Total |
|---|---|---|---|---|---|---|
| A Group | 29 | 22 | 32 | 34 | 20 | 137 |
| D Group | 19 | 29 | 38 | 17 | 32 | 135 |
| Total | 48 | 51 | 70 | 51 | 52 | 272 |

The table shows a rather even distribution between the A group and the D group in the five years selected, some years having more above-average students and some years having a majority of below-average students. It will be noticed that the total difference is only two. Presuming that the middle group of B and C students carried the greatest bulk of these classes, an even distribution of high-ranking and low-ranking pupils would seem to follow the normal curve.

## INTELLIGENCE QUOTIENTS

It is generally recognized that individual differences in mental ability are a prime factor in a student's achievement. In the many correlations which have been calculated between measures of mental age or intelligence and various

kinds of measures of achievement, the results have shown a consistently positive relationship between academic success and mental ability. On the contrary, investigation of the studies that show correlations between mental ability and shorthand achievement reveal no such dependence.

### TABLE II

### MEAN INTELLIGENCE QUOTIENTS OF STUDENTS INCLUDED IN STUDY

| | 1943 | 1944 | 1945 | 1946 | 1947 | Average |
|---|---|---|---|---|---|---|
| A Group | 112.6 | 117.1 | 113 | 116.4 | 113 | 114.4 |
| D Group | 106.7 | 107 | 103.4 | 107 | 101.5 | 105.1 |
| Difference | 5.9 | 10.1 | 9.6 | 9.4 | 11.5 | 9.3 |

In the investigation under consideration there was a range of from 85 to 133 among the D group, and a range of from 89 to 139 among the A group. The difference between the mean of the two groups was lowest in 1943 with a 5.9 variance, and highest in 1947 with a 11.5 variance. Comparing the average of the 135 cases in the D group--105.1 with the average of the 137 cases in the A group--114.4 we find a difference in the mean of a 9.3.

A study of this table and of the individual scores tends to leave the reader in agreement with Agnes Osborne's conclusion:

> .....some degree of relation exists between intelligence and shorthand achievement, but it also means that superior intelligence does not assure high achievement in shorthand and that low intelligence does not preclude high scores. In other words, the ability used by an individual, not necessarily the ability possessed by the individual, is the important factor in achievement. The correlation between intelligence and shorthand achievement suggests that success in shorthand is conditioned by intelligence to a lesser degree than success in academic subjects.[1]

## AVERAGE ATTENDANCE

In gathering the facts for this study, every student who averaged an A or a D in stenography for the years 1943 to 1947 was included, regardless of attendance. In other words, no case was omitted because of prolonged absence. The evidence as shown in Table III is, then, the average number of days absent in each of the years selected, including the total 272 cases. It will be observed that the absence of the below-average students was greater each year than was that of the above-average students and that the difference between the average number of days absent for both groups came to a 10.9. Again, it is suggested that the reader refer to the individual records in the appendix and note the effect of absence upon the scholastic rating. Such a comparison will bear out the claim of Stephens[2] that "the

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[1] Osborne. op. cit., p. 51.

[2] Stephens, J. M. The Influence of the School on the Individual. Ann Arbor, Michigan, Edwards Brothers, 1933.

relationship between school attendance and achievement is positive but surprisingly light. (The correlation ranges from .0 to 0.20, approximately.)"

TABLE III

AVERAGE NUMBER OF DAYS ABSENT

| | 1943 | 1944 | 1945 | 1946 | 1947 | Average |
|---|---|---|---|---|---|---|
| A Group | 13.3 | 12.6 | 15 | 17.9 | 13 | 14.3 |
| D Group | 28.1 | 19 | 19.8 | 32 | 27 | 25.2 |
| Difference | 4.8 | 6.4 | 4.8 | 14.1 | 14 | 10.9 |

## GENERAL AVERAGES

It was interesting to note that the general averages for the four years of high school of those students who had done above-average work in shorthand showed a B/ each year and an average mean of 88.5 for the five separate classes; while in the below-average group, the average each year was C with an average mean of 77.3 for the five years. The difference between averages ranged from 9.3 to 12.5 with an average difference of 11.2.

Perhaps it may be questioned that the general average should be lower each year than the shorthand average in the A group and higher each year in the D group. First, it must

be remembered that the students in this study were chosen because of their achievement (or lack of it) in stenography and not because of their general achievement. Secondly, the general average, comprising all the subjects for all four years and including the student's weak points as well as his strong, would quite naturally show that proportion. Therefore, the pictured table is true even if it is not too striking.

TABLE IV

GENERAL AVERAGE OF A AND D STUDENTS FROM 1943-1947

| | 1943 | 1944 | 1945 | 1946 | 1947 | Average |
|---|---|---|---|---|---|---|
| A Group | 87.5 | 88.9 | 89 | 88.3 | 89 | 88.5 |
| D Group | 78.2 | 78.1 | 76.6 | 77.4 | 76.5 | 77.3 |
| Difference | 9.3 | 10.8 | 12.4 | 10.9 | 12.5 | 11.2 |

## DIFFERENCE BETWEEN THE MEAN OF STENOGRAPHY AND SPECIFIED SUBJECTS

Because of the existent need from a vocational viewpoint of the mastery of typewriting with the mastery of stenography, it was found useful to compare the averages in these two subjects, which, it will be recalled, are both included in the student's curriculum during her last two years of high school. The marks for typewriting for each

of the five years under observation were averaged and compared with the averages of shorthand, and the difference between the means was worked out.

TABLE V

DIFFERENCE BETWEEN THE MEAN OF STENOGRAPHY AND TYPEWRITING

| A Group | 1943 | 1944 | 1945 | 1946 | 1947 | Avg. Mean |
|---|---|---|---|---|---|---|
| Stenography | 93.3 | 95 | 94.9 | 92.6 | 93.7 | 93.9 |
| Typewriting | 85.5 | 90.7 | 88.9 | 86.6 | 86 | 87.5 |
| Difference | 7.8 | 4.3 | 6.0 | 6.0 | 7.7 | 6.4 |
| - - - - - | | | | | | |
| D Group | | | | | | |
| Stenography | 72 | 74 | 71.8 | 70 | 72.2 | 72 |
| Typewriting | 73.9 | 80 | 79.4 | 76 | 75 | 76.8 |
| Difference | 1.9 | 6 | 7.6 | 6 | 2.8 | 4.8 |

From the preceding table it can be seen that there was a rather wide variation in the stenography and typewriting averages of the A group. The differences ranged from a 4.3 in 1944 to a 7.8 in 1943, averaging a total difference of 6.4. Converting the numbers into letters, it becomes evident that an A average was attained one year and that each of the other years averaged a B ≁.

There appears to be less variation in the D group, two years showing a comparatively small difference, the other three years carrying greater differences, giving a total difference of 4.8. One year averaged B; one year, D; three years, C; giving an average mean of C.

That the D group received each year a higher average in typewriting than in shorthand may be explainable when one considers that the typewriting mark is made up of two factors, production and speed, which will give more opportunity to the slower student to obtain a higher mark than that same student may receive in the more difficult skill of mastering shorthand. On the contrary, a C average in typewriting would in all probability affect the transcription rate and pull down the shorthand average.

## DIFFERENCE BETWEEN THE MEAN OF STENOGRAPHY AND THE LANGUAGE SUBJECTS

It is a growing belief that ability to achieve in the study of the languages gives a fairly accurate indication of the ability to successfully complete the study of stenography and transcription, and in the various correlations which have been made, it has been estimated that those of stenography with the languages rank among the highest and have been found quite reliable.

Adversely, it has been recommended to observe caution in using the language marks alone as a source of prognosis

because of the many irrelevant factors which enter into these subjects.

TABLE VI

DIFFERENCE BETWEEN THE MEAN OF STENOGRAPHY AND ENGLISH

| A Group | 1943 | 1944 | 1945 | 1946 | 1947 | Avg. Mean |
|---|---|---|---|---|---|---|
| Stenography | 93.3 | 95 | 94.9 | 92.6 | 93.7 | 93.9 |
| English | 92.4 | 89.3 | 88.3 | 88.2 | 91 | 89.8 |
| Difference | .9 | 5.7 | 6.6 | 4.4 | 2.7 | 4.1 |
| D Group | | | | | | |
| Stenography | 72 | 74 | 71.8 | 70 | 72.2 | 72 |
| English | 83.2 | 79 | 80 | 78 | 78.6 | 79.7 |
| Difference | 11.2 | 5 | 8.2 | 8 | 6.4 | 7.7 |

In the cases under consideration, every student's average was based on her yearly averages in the ninth and tenth grades in both Latin and English. It was thought more advisable to limit the English marks to the first two years to see if they might be of some prognostic value.

The preceding table indicates that there was a closer relationship between the averages in English and stenography for the A group than for the group with which it was compared. The greatest difference was a 6.6 in 1945; while in

1943 there was only the fractional difference of a .9, averaging a difference in the means of a 3.2. It should be worth while to see that the English average each year was either A or B/.

A range of differences from 5 to 11.2 marked the deviation in the D group, amounting to an average mean difference of 7.7. The yearly averages gave less indication as to possible failure work in shorthand, two years showing a B average and the other three years each showing a C average, totaling a final C average for the five years. Whether or not there is any significance in these differences will be shown in Table XI.

## DIFFERENCE BETWEEN THE MEAN OF STENOGRAPHY AND LATIN

During the years included in the statistics for this work, every student followed the same curriculum for her first two years of high school, and this curriculum included Latin for both years. (Since 1947 a choice of Latin or Spanish is given the student.) To use the average Latin marks of two years as a factor to help determine the probable success or failure of a student in her study of stenography would seem to have proved justifiable, both from a study of Table VII and from the study of the individual records in the appendix. Those students who were most successful in stenography averaged A in Latin for three separate years and a high B/ average for each of the other two years.

## TABLE VII

## DIFFERENCE BETWEEN THE MEAN OF STENOGRAPHY AND LATIN

| A Group | 1943 | 1944 | 1945 | 1946 | 1947 | Avg. Mean |
|---|---|---|---|---|---|---|
| Stenography | 93.3 | 95 | 94.9 | 92.6 | 93.7 | 93.9 |
| Latin | 92 | 89.8 | 89.5 | 91.3 | 91 | 90.7 |
| Difference | 1.2 | 5.2 | 5.4 | 1.3 | 2.7 | 3.2 |
| D Group | | | | | | |
| Stenography | 72 | 74 | 71.8 | 70 | 72.2 | 72 |
| Latin | 80.6 | 79 | 79.4 | 78 | 77 | 78.8 |
| Difference | 8.6 | 5 | 7.6 | 8 | 4.8 | 6.8 |

The lowest mean difference appeared in the table above where a 3.2 indicated a close relationship between Latin and stenography among the higher ability students. With rare exception (three to be exact) the individual scores showed nothing less than a B average, with A's predominating.

The averages in Latin for the D group followed closely those of English. 1943 showed a low B average, the other four years C averages. The Latin averages on the individual records of these students seem to have little predictive value. Several of them averaged a B/ and some even attained

an A which would certainly seem to indicate that they would be good risks for entrance into the stenographic curriculum. Probably other factors hindered their successful completion of stenography--absence, for example. On the other hand, it would seem that a C average in Latin in most cases is too great a risk for possible success in shorthand.

## COMPARISON OF STENOGRAPHY WITH GEOMETRY

During the years 1944-1945, the program of studies included general mathematics which might be elected instead of geometry. This made some change in the number of students under consideration in the next comparison, but since there were only twenty-three general mathematics students in the D group and four in the A group, and since these were not included when determining the mean, there was still a large enough group to give some reliability to the results. Table VIII represents the averages in geometry for 133 A students and 112 D students.

In analyzing Table VIII it is evident that there was a greater degree of difference between the averages of geometry and the averages of stenography for the A group than was found in the language subjects. The differences ranged from 5 in 1946 to 7.9 in 1945, averaging a mean difference of 6.4. The individual scores will show a few C averages in geometry, some A averages, but by far the greater number of B's. This

accounts for the fact that the following table shows a B+ general average every year.

We have the reverse of the picture in the D group. Three individual students attained an A average in geometry, a few more B, but by far the majority were numbered among the C and D averages. This would naturally give the results as recorded, with all the yearly averages in the C grouping. The yearly differences and the mean difference were similar to the differences in the other subjects.

TABLE VIII

DIFFERENCE BETWEEN THE MEAN OF STENOGRAPHY AND GEOMETRY

| A Group | 1943 | 1944 | 1945 | 1946 | 1947 | Avg. Mean |
|---|---|---|---|---|---|---|
| Stenography | 93.3 | 95 | 94.9 | 92.6 | 93.7 | 93.9 |
| Geometry | 87.7 | 88.3 | 87 | 87.6 | 87 | 87.5 |
| Difference | 5.6 | 6.7 | 7.9 | 5.0 | 6.7 | 6.4 |
| D Group | | | | | | |
| Stenography | 72 | 74 | 71.8 | 70 | 72.2 | 72 |
| Geometry | 78.2 | 78.6 | 78.2 | 77 | 74.3 | 77.6 |
| Difference | 6.2 | 4.6 | 6.4 | 7 | 2.1 | 5.6 |

## SUMMARY OF YEARLY AVERAGES INCLUDED IN STUDY

A summary of all the factors used in this investigation is given in Table IX. Thus at a glance, the reader can see the averages attained each year in each of the subjects used for comparison with stenography, as well as the average I.Q. of that class, the average number of days absent, and the average mean difference of the five years in each of the factors.

It may be worth while to observe that in the summarization of the superior stenographic students, there was not an average that fell below 85 or B⁄ for the entire five years in any one of the related subjects; that the relationship of the subjects with stenography was in proportion to the average mean; for example, Latin carried the highest average mean and bore the closest relationship to stenography, there being a difference of only 3.2. English ranked next in average mean--89.8, and the difference between this subject and stenography was 3.2. Geometry and typewriting showed the same average mean; therefore, the average mean difference was the same in both cases--6.4. It would be reasonable to expect that the intelligence quotient of this group would be superior to that of the lower-ability group, and neither is one surprised to find that the average attendance is better.

## TABLE IX

## SUMMARY OF YEARLY AVERAGES INCLUDED IN STUDY

| A Group | English | Latin | Geometry | Typewriting | Gen. Avg. | I.Q. | Absence | Stenography |
|---|---|---|---|---|---|---|---|---|
| 1943 | 92.4 | 92 | 87.7 | 85.5 | 87.5 | 112.6 | 13.3 | 93.3 |
| 1944 | 89.3 | 98.8 | 88.3 | 90.7 | 88.9 | 117.1 | 12.6 | 95 |
| 1945 | 88.3 | 89.5 | 87 | 88.9 | 89 | 113 | 15 | 94.9 |
| 1946 | 88.2 | 91.3 | 87.6 | 86.6 | 88.3 | 116.4 | 17.9 | 92.6 |
| 1947 | 91 | 91 | 87 | 86 | 89 | 113 | 13 | 93.7 |
| Avg.Mean | 89.8 | 90.7 | 87.5 | 87.5 | 88.5 | 114.4 | 14.3 | 93.9 |

## TABLE IX

## SUMMARY OF YEARLY AVERAGES INCLUDED IN STUDY

| D Group | English | Latin | Geometry | Typewriting | Gen. Avg. | I.Q. | Absence | Stenography |
|---|---|---|---|---|---|---|---|---|
| 1943 | 83.2 | 80.6 | 78.2 | 73.9 | 78.2 | 106.7 | 28.1 | 72 |
| 1944 | 79 | 79 | 78.6 | 80 | 78.1 | 107 | 19 | 74 |
| 1945 | 80 | 79.4 | 78.2 | 79.4 | 76.6 | 103.4 | 19.8 | 71.8 |
| 1946 | 78 | 78 | 77 | 76.2 | 77.4 | 107 | 32 | 70 |
| 1947 | 78.6 | 77 | 74.3 | 75 | 76.5 | 101.5 | 27 | 72.2 |
| Avg.Mean | 79.7 | 78.8 | 77.6 | 76.9 | 77.3 | 105.1 | 25.2 | 72 |

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| [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |
| [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |
| [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |
| [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |
| [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |
| [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |

The averages of the related subjects in the D group did not follow so regular a pattern as that of the A group. In English, Latin, and typewriting we found at least one B average for a given year, a D average in geometry and in typewriting one year, and C averages in all the other years. The average means all rank in the C grading, graduating from English, the highest, to typewriting, the lowest. The intelligence quotients were not low and would not seem to foretell below-average achievement. An average absence of 25 days a year is decidedly a detriment to success, especially in the mastery of a skill subject such as stenography.

## TESTS OF SIGNIFICANCE OF THE MEAN DIFFERENCES IN THE SPECIFIED SUBJECTS

There are apparently enough data in the preceding tables to dispel the suspicion that the differences may have arisen through accident, but to determine the statistical significance of the differences the t test was applied.[1]

Since the data were ungrouped, the standard deviation was derived by using the formula:[2]

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[1] Guilford, J. P. Fundamental Statistics in Psychology and Education. New York: McGraw Hill, 1942, p. 137.

[2] Ibid. p. 51.

$$S.D. = \sqrt{\frac{x^2}{N}}$$

where S.D. = standard deviation

$x$ = any deviation from the mean

$x^2$ = sum of the squared deviation

$N$ = number of cases

The standard error of the mean of each subject was then computed according to the following formula:[1]

$$S.E._m = \frac{S.D.}{\sqrt{N - 1}}$$

TABLE X

MEAN, STANDARD DEVIATION, AND STANDARD ERROR OF THE MEAN

| A Students | Mean | S.D. | $S.E._m$ |
|---|---|---|---|
| Stenography | 93.9 | 1.3 | .096 |
| English | 89.8 | 4.43 | .382 |
| Latin | 90.7 | 5.18 | .48 |
| Geometry | 87.5 | 5.9 | .52 |
| Typewriting | 87.5 | 5.8 | .49 |

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[1] Ibid. p. 128.

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

| [illegible] | [illegible] | [illegible] | [illegible] |
|---|---|---|---|
| [illegible] | [illegible] | [illegible] | [illegible] |
| [illegible] | [illegible] | [illegible] | [illegible] |
| [illegible] | [illegible] | [illegible] | [illegible] |
| [illegible] | [illegible] | [illegible] | [illegible] |
| [illegible] | [illegible] | [illegible] | [illegible] |

[illegible]

TABLE X (Continued)

MEAN, STANDARD DEVIATION, AND STANDARD ERROR OF THE MEAN OF ALL SUBJECTS

| D Students | Mean | S.D. | $S.E._m$ |
|---|---|---|---|
| Stenography | 72 | 1.2 | .10 |
| English | 79.7 | 5.6 | .48 |
| Latin | 78.8 | 6.3 | .55 |
| Geometry | 77.1 | 6.7 | .63 |
| Typewriting | 76.9 | 7.3 | .62 |

The t ratio was used to test the significance of the differences found within this study. In order to secure the standard error of the difference of the mean, the following formula[1] was employed:

$$S.E._{\bar{d}} = \sqrt{S.E.^{2}_{\bar{x}} + S.E.^{2}_{\bar{y}}}$$

In the A group there were 136 degrees of freedom, and in the D group 134 degrees, the total of which was 271. According to the tables formulated by Wallace and Snedecor[2] a t for 271 degrees of freedom should equal 1.968 at the 5 per cent

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[1] Treloar, Alan E. Elements of Statistical Reasoning. New York, John Wiley and Sons, Inc., 1939. p. 147.

[2] Guilford. op. cit. p. 323.

level of significance and 2.592 at the 1 per cent level of significance. It may be observed from Table XI that t in each case exceeded the 1 per cent level, and therefore, the difference in each case may be regarded as very significant. These t tests also indicate that the Null Hypothesis is untenable and that these differences did not happen by chance.

TABLE XI

T TESTS OF DIFFERENCES
BETWEEN STENOGRAPHY AND RELATED SUBJECTS

| A Group | Mean Diff. | S.E. diff. | t |
|---|---|---|---|
| Stenography--English | 4.1 | .382 | 10.7 |
| Stenography--Latin | 3.2 | .49 | 6.6 |
| Stenography--Geometry | 6.4 | .53 | 10.9 |
| Stenography--Typewriting | 6.4 | .49 | 13.1 |
| D Group | | | |
| Stenography--English | 7.7 | .48 | 16 |
| Stenography--Latin | 6.8 | .55 | 12.5 |
| Stenography--Geometry | 5.6 | .63 | 8.8 |
| Stenography--Typewriting | 4.9 | .62 | 7.9 |

# CHAPTER V

## SUMMARY AND RECOMMENDATIONS

The foremost consideration in undertaking this investigation was to gather data and present facts that would bring before the minds of school administrators and teachers the urgent need for more careful guidance and selection of students for the stenographic curriculum.

That day is past when the business department acts as the so-called "dumping grounds" of the school, wherein those students are placed who are judged incapable of pursuing a straight academic course; and the opinion is fast gaining ground that if one has failed to achieve success in the academic subjects, in all probability he will not succeed in the stenographic subjects. More and more, schools are extending their programs so as to provide courses that will prove beneficial to the moral and economic needs of the less gifted student; and instead of placing him in a course for which he does not possess the intelligence nor the aptitude, other fields are open to him. When a school can thus offer a variety of courses and can adequately guide students into their proper spheres, then and only then will failures be lessened and the individual, the school, and society be improved.

So that these conclusions will follow a logical pattern, each point of the purpose of the study as outlined in

Chapter I will be briefly summarized and commented upon.

1. To show by reports from competent authority that there are great numbers of failures in stenography.

Failures, as referred to in this study, include not only those students who did not attain a passing school grade, but also those marginal students who, because of their limited ability, were unable to secure stenographic positions upon graduation. It is a known fact that many students have received diplomas from our high schools who were given passing grades as a matter of formality in order to permit graduation. Unfortunately, among these are many business students, many stenographic prospects. With what results? A low grade in an academic subject may pass unnoticed, with no serious injury to the individual student or to society at large; but a low grade in a business subject, particularly shorthand, points to failure in that particular ambition, with a consequent lowering of morale for the individual, a weakening of respect for the school, and an economic loss for the community.

Another aspect of failure which was taken into consideration was the case of dropouts. If it is true, and a study of recent investigations points rather conclusively to the fact, that approximately one-half the students enrolled for stenography survive their second year; what becomes of the fifty percent failures? They look back upon a year of rather fruitless endeavor, with not much hope of success in the future. To mitigate the evil by saying that the one year of shorthand

may serve for personal use is small compensation when one enrolls in the course for the primary purpose of using that skill to earn a livelihood.

Since it can be seen that of the large numbers of students who enroll for shorthand far too many fail to achieve vocational competency, effort has been made and is continuing to be made to cut down mortality in this area by more careful guidance. Further emphasis may be brought to bear on this point by a summarization of the opinions of those who are interested in this phase of education and who see:

2. The wisdom for greater selectivity of students who wish to take the stenographic course.

In reviewing literature for this specific phase of the study, it was not a difficult task to find persons of every condition--employer, teacher, administrator, personnel manager, research worker--who, not only saw the need for more careful guidance into the business courses, but, who, because of their experience, were able to offer many valuable suggestions.

There is a general agreement among the persons quoted that individuals possess varying degrees of aptitudes or potentialities; and that it therefore become obligatory upon school administrators to guide students into those courses in which they will most likely succeed. The need for prognosis in business education is admitted; and, although attempts to find predictive measures have seemingly resulted in failure, all has not been futile, and the future holds promise of producing effective prognostic devices. One big step forward

is the recommendation to use transcription as the criterion upon which to base the predictive value of the measuring instrument rather than upon the ability to learn the bare fundamentals of shorthand writing. When this is accomplished, prediction will assuredly be more accurate.

The school in which this particular study was made administers the Turse Shorthand Aptitude Test as part of the guidance program before admitting students into the stenographic curriculum. The first plan was to correlate the results of these prognostic tests with final achievement test marks, under the three divisions--superior, average, and failure. However, because the testing program for one year was incomplete, the final conclusion was to omit the test marks entirely and confine the research to school grades. Accordingly, in the third point of the outline the procedure was:

> 3. To study the scholastic records of the stenographic students of a large high school over a period of five years--1943-1947.

Those students were termed "superior" who had received an A (90%-100%) as their final stenographic mark. Those students whose records showed a D (70%-75%) were classed as "below average." The average students, the B and C groups were not included.

From the four-year permanent records only those subjects were chosen which would seem to bear a close relationship to stenography, and the averages were confined to the first two

years of the high school course. Intelligence quotients, absence, and the general average of the four years were also recorded to see if there would be any significance between them and the final mark in stenography.

In order to ascertain what degree of relationship existed between stenography and the related subjects, it was deemed expedient to follow out the fourth item of the outline in Chapter I, viz.:

4. To work out a difference between the mean of specified subjects with stenography.

The tables in Chapter IV show the result of this work. Summing up the data obtained by determining the difference between the means, it may be concluded: (1) Of the subjects chosen, not one mean average fell below an 87 per cent in the A group; the lowest mean average of the D group was 76 per cent, the highest, 79 per cent. (2) A lesser degree of variation was evident for the A group in English and Latin, and for the D group in typewriting and geometry.

To see if there was any significance in these differences, the next step was:

5. To determine by means of the t test the significance between these means.

The steps as outlined in Chapter IV were carried through and by means of the application of the t test it was shown that the differences in each case were very significant and could not have happened by chance. It would therefore seem that to use the school grades as one factor for predicating

success or failure in stenography is not only justifiable but recommendable.

In the strong conviction that there should be more careful guidance and selection of students for the stenographic curriculum and that there are prognostic measures for determining the choice of these students, this study will be concluded by presenting the means now employed at Seton High School to further this conviction. This is the last point of the outline:

6. To formulate a more reliable procedure for selection of students for the stenographic course.

To predict with any degree of accuracy whether or not students will be successful in stenography, which subject they may elect in their junior year, it is necessary to have a complete and continuous picture of their intelligence quotients and of their scholastic achievement during their first two years of high school. With this in mind, the California Short Form Test of Mental Maturity is administered upon the student's entrance into the school. Another form of the same test is given in the third year. Standardized examinations in all subjects are given at the mid-term and at the end of the scholastic year. Although the school office keeps a record of all these test results, only the scores and percentiles of the June examinations are considered by the business department when collecting the various scholastic factors deemed necessary for entrance into the

stenographic curriculum.

In April of their sophomore year those students who desire to take shorthand are given the Turse Shorthand Aptitude Test and a standardized English test. The results of the last two tests, the general scholastic rating of their first two years of high school, their I.Q. scores, and their achievement in the June examinations are all then carefully studied and analyzed. Any prospect who falls below the fortieth percentile in the aptitude test is advised not to take shorthand, even though her scholastic ratings might indicate success. Contrariwise, a student showing a high aptitude whose scholastic ratings are low is directed elsewhere, since she in all probability would not make a successful transcription student. The final choice, however, rests with the student. If, after every effort is made to advise and guide her into a course where her chances of success are good, she still insists upon following the stenographic course, permission is given.

The above plan for a more thorough and more careful selection of students for the stenographic course has been in operation only two years at Seton High School. To assert that it solves the problem of lessening failures would be to judge too quickly and perhaps rashly. The first year's trial of the plan, however, showed favorable results. Of a class of seventy transcription students, only four were failures.

three because of prolonged absenteeism and the fourth because of low aptitude in shorthand which fact had been brought to her attention prior to her taking the course. If the percentage of failures stays this low for the next four years, it would seem that the selection of students for the stenographic course by means of the methods now in use may be considered a step forward towards the lessening of failures and that the present study has contributed in some slight degree to advance the work already done in the program of prognosis and guidance.

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# APPENDIXES

# APPENDIX A

## OUTLINE OF COURSES

Seton High School
Baltimore, Maryland

### First Year

| 1 A<br>Leading to<br>LATIN SCIENCE<br>and<br>MODERN CLASSICAL | Units | 1 B<br>Leading to<br>ACADEMIC COMMERCIAL<br>and<br>GENERAL BUSINESS | Units |
|---|---|---|---|
| Religion | ½ | Religion | ½ |
| English I | 1 | English I | 1 |
| Latin I | 1 | Spanish I | 1 |
| World History | 1 | World History | 1 |
| Algebra I | 1 | Algebra I | 1 |
| Art | ¼ | Art | ¼ |
| Music | | Music | |
| Physical Education | | Physical Education | |

### Second Year

| 2 A | Units | 2 B | Units |
|---|---|---|---|
| Religion | ½ | Religion | ½ |
| English II | 1 | English II | 1 |
| Latin II | 1 | Spanish II | 1 |
| Biology | 1 | Biology | 1 |
| Plane Geometry | 1 | General Math. | 1 |
| Foods & Clothing | ¼ | Foods & Clothing | ¼ |
| Music | | Music | |
| Physical Education | | Physical Education | |

## Third Year

### 3 $A_1$

### LATIN SCIENCE

| | Units |
|---|---|
| Religion | ½ |
| English III | 1 |
| Latin III | 1 |
| Chemistry | 1 |
| Algebra II | ½ |
| French I | 1 |
| Music | |

### 3 $A_2$

### MODERN CLASSICAL

| | Units |
|---|---|
| Religion | ½ |
| English III | 1 |
| Modern History | 1 |
| Chemistry | 1 |
| Algebra II | ½ |
| French I | 1 |
| Music | |

### 3 $B_1$

### ACADEMIC COMMERCIAL

| | Units |
|---|---|
| Religion | ½ |
| English III | 1 |
| Modern History | 1 |
| Shorthand I | 1 |
| Business Arithmetic | 1 |
| Typing I | ½ |
| Music | |

### 3 $B_2$

### GENERAL BUSINESS

| | Units |
|---|---|
| Religion | ½ |
| English III | 1 |
| Modern History | 1 |
| General Business Training | 1 |
| Business Arithmetic | 1 |
| Typing I | ½ |
| Music | |

## Fourth Year

### 4 $A_1$

### LATIN SCIENCE

| | Units |
|---|---|
| Religion | ½ |
| English IV | 1 |
| Latin IV | 1 |
| American History | 1 |
| French II | 1 |
| Physics | 1 |
| Music | |

### 4 $A_2$

### MODERN CLASSICAL

| | Units |
|---|---|
| Religion | ½ |
| English IV | 1 |
| Sociology | 1 |
| American History | 1 |
| French II | 1 |
| General Math. | 1 |
| Music | |

### 4 $B_1$

### ACADEMIC COMMERCIAL

| | Units |
|---|---|
| Religion | ½ |
| English IV | 1 |
| American History | 1 |
| Shorthand II | 1 |
| Typing II | ½ |
| Bookkeeping | 1 |
| Music | |

### 4 $B_2$

### GENERAL BUSINESS

| | Units |
|---|---|
| Religion | ½ |
| English IV | 1 |
| American History | 1 |
| Bookkeeping | 1 |
| Typing II | ½ |
| Office Machines | 1 |
| Music | |

# APPENDIX B

## INDIVIDUAL RECORDS OF SUPERIOR STUDENTS

## 1943

| Student | English | Latin | Geometry | Typing | Steno. | Gen.Avg. | I.Q. | Absence |
|---|---|---|---|---|---|---|---|---|
| 1 | 95 | 95 | 95 | 95 | 96 | 93 | 109 | 10 |
| 2 | 95 | 87 | 85 | 85 | 92 | 85 | 111 | 24 |
| 3 | 95 | 95 | 95 | 75 | 94 | 91 | 104 | 0 |
| 4 | 95 | 90 | 85 | 95 | 93 | 90 | 118 | 16 |
| 5 | 95 | 95 | 95 | 85 | 97 | 90 | 123 | 5 |
| 6 | 90 | 90 | 95 | 85 | 93 | 90 | 103 | 6 |
| 7 | 90 | 85 | 75 | 75 | 90 | 83 | 100 | 15 |
| 8 | 90 | 95 | 85 | 95 | 97 | 89 | 98 | 15 |
| 9 | 95 | 95 | 95 | 75 | 98 | 92 | 110 | 7 |
| 10 | 95 | 95 | 95 | 85 | 92 | 85 | 131 | 44 |
| 11 | 85 | 87 | 85 | 85 | 93 | 85 | 104 | 28 |
| 12 | 90 | 80 | 75 | 85 | 92 | 85 | 112 | 25 |
| 13 | 95 | 95 | 75 | 85 | 92 | 87 | 101 | 12 |
| 14 | 90 | 90 | 85 | 75 | 92 | 86 | 121 | 11 |
| 15 | 90 | 90 | 85 | 75 | 91 | 84 | 130 | 32 |
| 16 | 90 | 90 | 85 | 85 | 95 | 93 | 127 | 8 |
| 17 | 90 | 95 | 85 | 85 | 93 | 88 | 109 | 1 |
| 18 | 90 | 90 | 85 | 85 | 92 | 87 | 110 | 83 |
| 19 | 95 | 95 | 85 | 85 | 93 | 87 | 127 | 12 |
| 20 | 95 | 95 | 95 | 95 | 93 | 92 | 123 | 7 |
| 21 | 90 | 95 | 95 | 85 | 95 | 90 | 112 | 11 |
| 22 | 95 | 95 | 85 | 85 | 93 | 92 | 112 | 6 |
| 23 | 90 | 87 | 85 | 85 | 92 | 89 | 117 | 10 |
| 24 | 95 | 95 | 95 | 95 | 94 | 91 | 124 | 53 |
| 25 | 95 | 95 | 95 | 95 | 96 | 93 | 113 | 4 |
| 26 | 95 | 95 | 85 | 75 | 92 | 86 | 112 | 0 |
| 27 | 95 | 95 | 85 | 90 | 93 | 92 | 114 | 9 |
| 28 | 87 | 87 | 85 | 85 | 92 | 86 | 115 | 11 |
| 29 | 95 | 95 | 95 | 95 | 98 | 92 | 118 | 15 |

## INDIVIDUAL RECORDS OF SUPERIOR STUDENTS

### 1944

| Student | English | Latin | Geometry | Typing | Steno. | Gen.Avg. | I.Q. | Absence |
|---|---|---|---|---|---|---|---|---|
| 1 | 90 | 95 | 95 | 85 | 97 | 92 | 128 | 14 |
| 2 | 95 | 95 | 95 | 95 | 98 | 95 | 112 | 0 |
| 3 | 95 | 95 | 95 | 95 | 97 | 93 | 110 | 7 |
| 4 | 90 | 90 | 85 | 95 | 92 | 86 | 97 | 3 |
| 5 | 90 | 90 | 95 | 85 | 93 | 88 | 113 | 5 |
| 6 | 90 | 90 | 85 | 90 | 93 | 90 | 117 | 0 |
| 7 | 85 | 90 | 85 | 90 | 95 | 89 | 128 | 19 |
| 8 | 90 | 95 | 85 | 95 | 93 | 90 | 139 | 3 |
| 9 | 85 | 85 | 85 | 85 | 94 | 84 | 118 | 3 |
| 10 | 85 | 85 | 85 | 95 | 96 | 90 | 121 | 12 |
| 11 | 75 | 75 | 85 | 85 | 94 | 80 | 113 | 6 |
| 12 | 95 | 95 | 95 | 95 | 98 | 93 | 120 | 0 |
| 13 | 90 | 95 | 85 | 85 | 93 | 88 | 102 | 19 |
| 14 | 85 | 85 | 85 | 95 | 93 | 88 | 107 | 12 |
| 15 | 90 | 85 | 85 | 95 | 95 | 88 | 134 | 30 |
| 16 | 85 | 75 | 85 | 90 | 92 | 84 | 121 | 37 |
| 17 | 90 | 95 | 95 | 95 | 96 | 93 | 123 | 24 |
| 18 | 95 | 95 | 95 | 95 | 93 | 93 | 116 | 12 |
| 19 | 90 | 90 | 85 | 85 | 92 | 86 | 105 | 22 |
| 20 | 95 | 90 | 85 | 95 | 95 | 88 | 117 | 12 |
| 21 | 95 | 95 | GM | 85 | 92 | 91 | 112 | 14 |
| 22 | 85 | 90 | 85 | 85 | 92 | 86 | 124 | 23 |

## INDIVIDUAL RECORDS OF SUPERIOR STUDENTS

## 1945

| Student | English | Latin | Geometry | Typing | Steno. | Gen.Avg. | I.Q. | Absence |
|---|---|---|---|---|---|---|---|---|
| 1 | 90 | 90 | 95 | 85 | 95 | 90 | 121 | 10 |
| 2 | 85 | 90 | GM* | 90 | 93 | 89 | 111 | 21 |
| 3 | 90 | 90 | 75 | 85 | 92 | 85 | 115 | 13 |
| 4 | 85 | 90 | 85 | 85 | 93 | 87 | 109 | 9 |
| 5 | 95 | 95 | 95 | 95 | 98 | 95 | 127 | 25 |
| 6 | 90 | 85 | 85 | 85 | 93 | 86 | 121 | 39 |
| 7 | 85 | 90 | 95 | 85 | 92 | 88 | 113 | 16 |
| 8 | 85 | 80 | GM | 85 | 92 | 87 | 98 | 6 |
| 9 | 90 | 95 | 85 | 95 | 94 | 89 | 115 | 30 |
| 10 | 90 | 90 | 75 | 95 | 92 | 89 | 113 | 5 |
| 11 | 95 | 95 | 95 | 95 | 93 | 94 | 118 | 16 |
| 12 | 85 | 95 | GM | 85 | 95 | 88 | 100 | 12 |
| 13 | 80 | 85 | GM | 95 | 92 | 85 | 103 | 2 |
| 14 | 80 | 80 | 75 | 85 | 90 | 80 | 109 | 18 |
| 15 | 80 | 80 | 75 | 85 | 93 | 83 | 111 | 2 |
| 16 | 90 | 90 | 85 | 95 | 94 | 90 | 129 | 24 |
| 17 | 80 | 85 | 75 | 85 | 92 | 83 | 97 | 10 |
| 18 | 85 | 90 | 85 | 90 | 92 | 89 | 117 | 6 |
| 19 | 95 | 95 | 95 | 90 | 92 | 94 | 130 | 6 |
| 20 | 85 | 85 | 95 | 85 | 93 | 85 | 121 | 20 |
| 21 | 85 | 85 | 85 | 85 | 92 | 84 | 104 | 21 |
| 22 | 85 | 75 | 75 | 90 | 93 | 85 | 109 | 22 |
| 23 | 95 | 95 | 95 | 95 | 97 | 94 | 125 | 10 |
| 24 | 95 | 95 | 85 | 75 | 93 | 91 | 124 | 25 |
| 25 | 95 | 95 | 95 | 85 | 96 | 92 | 106 | 4 |
| 26 | 85 | 85 | 85 | 85 | 93 | 86 | 112 | 14 |
| 27 | 90 | 90 | 85 | 95 | 92 | 89 | 118 | 13 |
| 28 | 95 | 95 | 95 | 90 | 93 | 93 | 109 | 18 |
| 29 | 90 | 95 | 95 | 95 | 96 | 92 | 103 | 12 |
| 30 | 90 | 95 | 95 | 85 | 93 | 90 | 121 | 19 |
| 31 | 95 | 95 | 95 | 95 | 97 | 94 | 115 | 16 |
| 32 | 85 | 90 | 85 | 95 | 98 | 95 | 89 | 2 |

*General Mathematics

## INDIVIDUAL RECORDS OF SUPERIOR STUDENTS

### 1946

| Student | English | Latin | Geometry | Typing | Steno. | Gen.Avg. | I.Q. | Absence |
|---|---|---|---|---|---|---|---|---|
| 1 | 85 | 85 | 95 | 85 | 94 | 88 | 110 | 11 |
| 2 | 95 | 95 | 95 | 95 | 97 | 91 | 114 | 11 |
| 3 | 95 | 95 | 95 | 95 | 93 | 92 | 103 | 2 |
| 4 | 90 | 90 | 85 | 85 | 92 | 87 | 113 | 37 |
| 5 | 90 | 95 | 85 | 95 | 97 | 91 | 123 | 1 |
| 6 | 90 | 95 | 85 | 90 | 92 | 85 | 126 | 11 |
| 7 | 85 | 90 | 75 | 70 | 90 | 82 | 112 | 85 |
| 8 | 85 | 85 | 85 | 85 | 92 | 86 | 117 | 15 |
| 9 | 90 | 90 | 75 | 75 | 92 | 84 | 121 | 16 |
| 10 | 95 | 95 | 85 | 85 | 98 | 92 | 119 | 11 |
| 11 | 90 | 95 | 85 | 85 | 97 | 90 | 118 | 12 |
| 12 | 90 | 90 | 85 | 80 | 96 | 85 | 126 | 38 |
| 13 | 90 | 94 | 95 | 95 | 98 | 92 | 129 | 7 |
| 14 | 84 | 92 | 94 | 95 | 93 | 92 | 105 | 1 |
| 15 | 80 | 90 | 85 | 80 | 92 | 84 | 118 | 0 |
| 16 | 85 | 90 | 95 | 90 | 93 | 86 | 127 | 50 |
| 17 | 85 | 85 | 85 | 90 | 93 | 87 | 104 | 25 |
| 18 | 85 | 85 | 85 | 85 | 92 | 85 | 115 | 22 |
| 19 | 90 | 95 | 75 | 75 | 96 | 89 | 128 | 22 |
| 20 | 85 | 90 | 75 | 95 | 96 | 89 | 114 | 6 |
| 21 | 90 | 95 | 85 | 90 | 95 | 91 | 135 | 13 |
| 22 | 85 | 95 | 95 | 90 | 94 | 90 | 113 | 6 |
| 23 | 95 | 95 | 95 | 90 | 95 | 93 | 124 | 44 |
| 24 | 90 | 95 | 95 | 85 | 92 | 88 | 120 | 25 |
| 25 | 95 | 95 | 95 | 95 | 93 | 92 | 112 | 7 |
| 26 | 85 | 88 | 85 | 85 | 92 | 86 | 107 | 34 |
| 27 | 90 | 90 | 95 | 80 | 92 | 88 | 125 | 7 |
| 28 | 90 | 95 | 95 | 85 | 95 | 92 | 119 | 20 |
| 29 | 85 | 90 | 85 | 85 | 92 | 87 | 102 | 14 |
| 30 | 85 | 90 | 85 | 95 | 92 | 84 | 107 | 10 |
| 31 | 80 | 80 | 75 | 85 | 92 | 83 | 114 | 10 |
| 32 | 85 | 90 | 85 | 85 | 92 | 87 | 108 | 12 |
| 33 | 90 | 95 | 95 | 90 | 98 | 93 | 97 | 1 |
| 34 | 90 | 90 | 95 | 85 | 97 | 91 | 125 | 21 |

## INDIVIDUAL RECORDS OF SUPERIOR STUDENTS

### 1947

| Student | English | Latin | Geometry | Typing | Steno. | Gen. Avg. | I.Q. | Absence |
|---|---|---|---|---|---|---|---|---|
| 1 | 90 | 85 | 85 | 80 | 94 | 88 | 125 | 36 |
| 2 | 95 | 95 | 85 | 85 | 93 | 87 | 110 | 12 |
| 3 | 90 | 90 | 85 | 85 | 91 | 89 | 107 | 0 |
| 4 | 90 | 85 | 85 | 85 | 93 | 87 | 100 | 18 |
| 5 | 90 | 95 | 85 | 80 | 93 | 88 | 113 | 10 |
| 6 | 90 | 95 | 85 | 85 | 93 | 87 | 114 | 23 |
| 7 | 90 | 95 | 95 | 85 | 93 | 89 | 112 | 15 |
| 8 | 95 | 95 | 95 | 95 | 98 | 95 | 118 | 23 |
| 9 | 90 | 90 | 85 | 80 | 93 | 86 | 116 | 16 |
| 10 | 95 | 95 | 95 | 85 | 95 | 91 | 119 | 4 |
| 11 | 90 | 85 | 85 | 85 | 93 | 87 | 107 | 7 |
| 12 | 90 | 95 | 95 | 90 | 96 | 92 | 113 | 12 |
| 13 | 90 | 90 | 85 | 85 | 93 | 88 | 110 | 12 |
| 14 | 85 | 90 | 85 | 75 | 92 | 85 | 110 | 16 |
| 15 | 95 | 95 | 95 | 90 | 97 | 94 | 125 | 0 |
| 16 | 90 | 85 | 85 | 85 | 93 | 88 | 111 | 6 |
| 17 | 90 | 95 | 85 | 95 | 93 | 89 | 114 | 18 |
| 18 | 90 | 90 | 75 | 85 | 92 | 87 | 104 | 17 |
| 19 | 90 | 95 | 85 | 85 | 96 | 92 | 120 | 3 |
| 20 | 90 | 85 | 85 | 90 | 92 | 87 | 109 | 3 |

## INDIVIDUAL RECORDS OF BELOW-AVERAGE STUDENTS

## 1943

| Student | English | Latin | Geometry | Typing | Steno. | Gen.Avg. | I.Q. | Absence |
|---|---|---|---|---|---|---|---|---|
| 1 | 80 | 85 | 85 | 75 | 72 | 80 | 110 | 25 |
| 2 | 70 | 70 | 70 | 75 | 72 | 70 | 109 | 5 |
| 3 | 90 | 80 | 70 | 70 | 70 | 78 | 98 | 6 |
| 4 | 90 | 85 | 85 | 75 | 72 | 81 | 109 | 69 |
| 5 | 80 | 85 | 75 | 75 | 75 | 78 | 115 | 47 |
| 6 | 70 | 70 | 75 | 70 | 72 | 72 | 101 | 27 |
| 7 | 85 | 85 | 85 | 75 | 74 | 82 | 113 | 1 |
| 8 | 80 | 85 | 75 | 70 | 72 | 79 | 100 | 14 |
| 9 | 80 | 80 | 75 | 85 | 72 | 78 | 105 | 33 |
| 10 | 80 | 80 | 75 | 75 | 72 | 79 | 103 | 32 |
| 11 | 85 | 70 | 70 | 70 | 70 | 73 | 97 | 6 |
| 12 | 90 | 90 | 85 | 70 | 73 | 84 | 112 | 54 |
| 13 | 90 | 80 | 85 | 75 | 72 | 80 | 105 | 6 |
| 14 | 95 | 90 | 85 | 75 | 74 | 85 | 115 | 29 |
| 15 | 80 | 75 | 70 | 70 | 72 | 73 | 100 | 48 |
| 16 | 95 | 87 | 85 | 75 | 73 | 84 | 111 | 27 |
| 17 | 90 | 85 | 85 | 85 | 75 | 84 | 124 | 19 |
| 18 | 80 | 75 | 75 | 70 | 70 | 74 | 93 | 49 |
| 19 | 70 | 75 | 75 | 70 | 70 | 73 | 108 | 36 |

## INDIVIDUAL RECORDS OF BELOW-AVERAGE STUDENTS

### 1944

| Student | English | Latin | Geometry | Typing | Steno. | Gen.Avg. | I.Q. | Absence |
|---|---|---|---|---|---|---|---|---|
| 1 | 75 | 80 | 75 | 70 | 73 | 77 | 133 | 10 |
| 2 | 75 | 70 | GM | 85 | 71 | 76 | 97 | 6 |
| 3 | 75 | 80 | 75 | 75 | 72 | 77 | 121 | 18 |
| 4 | 75 | 80 | GM | 95 | 72 | 78 | 87 | 15 |
| 5 | 75 | 80 | 70 | 85 | 72 | 77 | 110 | 22 |
| 6 | 85 | 90 | 85 | 85 | 74 | 85 | 111 | 0 |
| 7 | 75 | 70 | GM | 70 | 70 | 76 | 100 | 10 |
| 8 | 85 | 85 | 75 | 75 | 73 | 83 | 118 | 8 |
| 9 | 80 | 80 | 75 | 75 | 72 | 78 | 115 | 51 |
| 10 | 85 | 80 | 75 | 70 | 73 | 78 | 111 | 60 |
| 11 | 75 | 75 | 70 | 70 | 71 | 73 | 106 | 16 |
| 12 | 85 | 85 | 85 | 75 | 74 | 84 | 115 | 8 |
| 13 | 85 | 85 | 75 | 75 | 74 | 80 | 122 | 4 |
| 14 | 80 | 80 | 75 | 75 | 72 | 79 | 109 | 32 |
| 15 | 80 | 70 | 70 | 70 | 71 | 75 | 100 | 49 |
| 16 | 85 | 85 | 85 | 95 | 75 | 84 | 114 | 7 |
| 17 | 85 | 85 | 85 | 70 | 72 | 83 | 114 | 75 |
| 18 | 80 | 75 | GM | 95 | 70 | 75 | 90 | 19 |
| 19 | 80 | 80 | GM | 75 | 72 | 79 | 107 | 4 |
| 20 | 75 | 85 | 85 | 75 | 73 | 79 | 106 | 21 |
| 21 | 80 | 75 | 85 | 85 | 72 | 80 | 114 | 10 |
| 22 | 70 | 70 | GM | 85 | 68 | 73 | 96 | 2 |
| 23 | 80 | 80 | 85 | 85 | 72 | 79 | 107 | 10 |
| 24 | 85 | 90 | 85 | 85 | 74 | 84 | 117 | 11 |
| 25 | 70 | 70 | GM | 75 | 68 | 73 | 87 | 24 |
| 26 | 80 | 80 | 75 | 95 | 72 | 79 | 119 | 17 |
| 27 | 70 | 80 | GM | 85 | 71 | 78 | 95 | 17 |
| 28 | 75 | 70 | GM | 95 | 70 | 75 | 85 | 5 |
| 29 | 80 | 80 | 85 | 75 | 70 | 76 | 103 | 16 |

## INDIVIDUAL RECORDS OF BELOW-AVERAGE STUDENTS

## 1945

| Student | English | Latin | Geometry | Typing | Steno. | Gen.Avg. | I.Q. | Absence |
|---|---|---|---|---|---|---|---|---|
| 1 | 80 | 80 | 75 | 75 | 74 | 81 | 110 | 19 |
| 2 | 90 | 95 | GM | 85 | 74 | 90 | 108 | 1 |
| 3 | 80 | 80 | GM | 85 | 72 | 78 | 97 | 26 |
| 4 | 85 | 90 | GM | 75 | 74 | 84 | 98 | 45 |
| 5 | 80 | 80 | 75 | 70 | 72 | 75 | 103 | 25 |
| 6 | 85 | 85 | GM | 75 | 73 | 82 | 91 | 8 |
| 7 | 80 | 85 | 85 | 95 | 72 | 82 | 110 | 18 |
| 8 | 80 | 80 | 85 | 70 | 72 | 81 | 116 | 32 |
| 9 | 85 | 85 | 75 | 75 | 72 | 79 | 106 | 39 |
| 10 | 70 | 70 | 75 | 70 | 68 | 70 | 88 | 29 |
| 11 | 85 | 75 | 75 | 75 | 72 | 75 | 97 | 17 |
| 12 | 80 | 85 | 75 | 85 | 72 | 81 | 109 | 19 |
| 13 | 70 | 70 | 70 | 70 | 68 | 71 | 102 | 19 |
| 14 | 85 | 75 | 75 | 85 | 72 | 75 | 105 | 29 |
| 15 | 80 | 80 | 70 | 85 | 72 | 75 | 116 | 21 |
| 16 | 85 | 80 | 70 | 85 | 74 | 85 | 105 | 12 |
| 17 | 75 | 75 | GM | 85 | 72 | 79 | 102 | 14 |
| 18 | 85 | 85 | 85 | 75 | 72 | 84 | 124 | 13 |
| 19 | 85 | 85 | 85 | 95 | 74 | 85 | 116 | 15 |
| 20 | 75 | 75 | 85 | 85 | 72 | 77 | 112 | 21 |
| 21 | 85 | 90 | 85 | 75 | 73 | 84 | 98 | 42 |
| 22 | 85 | 85 | 95 | 70 | 73 | 83 | 110 | 11 |
| 23 | 80 | 70 | 70 | 85 | 72 | 75 | 110 | 7 |
| 24 | 75 | 75 | GM | 90 | 73 | 79 | 102 | 3 |
| 25 | 75 | 75 | GM | 70 | 72 | 75 | 97 | 58 |
| 26 | 85 | 80 | 70 | 70 | 72 | 75 | 103 | 44 |
| 27 | 75 | 85 | GM | 95 | 72 | 82 | 89 | 0 |
| 28 | 85 | 85 | 75 | 75 | 72 | 82 | 112 | 1 |
| 29 | 80 | 80 | 95 | 75 | 73 | 82 | 100 | 6 |
| 30 | 80 | 85 | 75 | 95 | 72 | 81 | 98 | 1 |
| 31 | 80 | 75 | GM | 70 | 72 | 75 | 98 | 8 |
| 32 | 80 | 70 | 85 | 70 | 72 | 77 | 106 | 10 |
| 33 | 80 | 70 | GM | 85 | 72 | 77 | 99 | 13 |
| 34 | 75 | 75 | 75 | 70 | 71 | 72 | 113 | 32 |
| 35 | 80 | 75 | GM | 85 | 72 | 79 | 89 | 25 |
| 36 | 80 | 85 | GM | 75 | 72 | 78 | 101 | 13 |
| 37 | 75 | 70 | 70 | 70 | 68 | 70 | 91 | 30 |
| 38 | 75 | 75 | GM | 95 | 71 | 75 | 99 | 27 |

# INDIVIDUAL RECORDS OF BELOW-AVERAGE STUDENTS

## 1946

| Student | English | Latin | Geometry | Typing | Steno. | Gen.Avg. | I.Q. | Absence |
|---|---|---|---|---|---|---|---|---|
| 1 | 85 | 80 | 75 | 85 | 72 | 79 | 113 | 6 |
| 2 | 80 | 85 | 75 | 75 | 74 | 80 | 111 | 6 |
| 3 | 70 | 70 | GM | 75 | 68 | 72 | 100 | 42 |
| 4 | 80 | 70 | 70 | 75 | 72 | 77 | 108 | 54 |
| 5 | 80 | 95 | 85 | 85 | 74 | 84 | 109 | 11 |
| 6 | 75 | 75 | 75 | 75 | 72 | 75 | 109 | 21 |
| 7 | 74 | 77 | 80 | 80 | 72 | 78 | 90 | 7 |
| 8 | 75 | 80 | 85 | 70 | 72 | 79 | 118 | 13 |
| 9 | 75 | 75 | 75 | 75 | 73 | 78 | 104 | 45 |
| 10 | 80 | 75 | 75 | 75 | 72 | 78 | 110 | 35 |
| 11 | 75 | 75 | 75 | 75 | 72 | 75 | 110 | 44 |
| 12 | 80 | 85 | 75 | 70 | 73 | 80 | 113 | 42 |
| 13 | 90 | 80 | 85 | 75 | 74 | 80 | 130 | 36 |
| 14 | 80 | 80 | 85 | 85 | 74 | 81 | 111 | 1 |
| 15 | 75 | 80 | 75 | 70 | 71 | 74 | 100 | 88 |
| 16 | 75 | 70 | 75 | 75 | 70 | 73 | 89 | 14 |
| 17 | 70 | 80 | 70 | 75 | 71 | 73 | 101 | 76 |

## INDIVIDUAL RECORDS OF BELOW-AVERAGE STUDENTS

### 1947

| Student | English | Latin | Geometry | Typing | Steno. | Gen.Avg. | I.Q. | Absence |
|---|---|---|---|---|---|---|---|---|
| 1 | 85 | 80 | 85 | 85 | 74 | 83 | 103 | 41 |
| 2 | 70 | 70 | 70 | 75 | 72 | 73 | 94 | 31 |
| 3 | 70 | 70 | 70 | 70 | 72 | 70 | 98 | 41 |
| 4 | 75 | 70 | 70 | 70 | 73 | 73 | 96 | 33 |
| 5 | 70 | 70 | 70 | 80 | 72 | 73 | 104 | 31 |
| 6 | 77 | 70 | 75 | 75 | 68 | 75 | 102 | 9 |
| 7 | 85 | 75 | 75 | 75 | 74 | 79 | 106 | 19 |
| 8 | 85 | 90 | 95 | 70 | 71 | 85 | 113 | 15 |
| 9 | 85 | 85 | 85 | 75 | 74 | 82 | 102 | 35 |
| 10 | 80 | 75 | 85 | 75 | 72 | 76 | 114 | 20 |
| 11 | 80 | 70 | 70 | 70 | 72 | 74 | 96 | 35 |
| 12 | 80 | 70 | 70 | 70 | 71 | 72 | 95 | 15 |
| 13 | 80 | 85 | 75 | 75 | 68 | 81 | 88 | 2 |
| 14 | 80 | 75 | 70 | 75 | 73 | 77 | 102 | 23 |
| 15 | 80 | 75 | 75 | 70 | 74 | 75 | 103 | 36 |
| 16 | 80 | 75 | 70 | 80 | 73 | 78 | 113 | 48 |
| 17 | 80 | 70 | 70 | 70 | 72 | 72 | 100 | 52 |
| 18 | 80 | 70 | 70 | 75 | 72 | 73 | 101 | 10 |
| 19 | 75 | 70 | 70 | 75 | 74 | 73 | 95 | 64 |
| 20 | 70 | 80 | 70 | 75 | 73 | 75 | 100 | 18 |
| 21 | 75 | 75 | 70 | 70 | 72 | 74 | 109 | 15 |
| 22 | 75 | 70 | 75 | 80 | 68 | 72 | 96 | 3 |
| 23 | 85 | 90 | 75 | 70 | 74 | 83 | 101 | 22 |
| 24 | 75 | 80 | 70 | 80 | 72 | 75 | 101 | 27 |
| 25 | 85 | 85 | 75 | 80 | 74 | 79 | 97 | 16 |
| 26 | 80 | 85 | 75 | 80 | 72 | 76 | 97 | 24 |
| 27 | 85 | 95 | 85 | 80 | 74 | 87 | 101 | 31 |
| 28 | 80 | 75 | 85 | 75 | 73 | 78 | 99 | 14 |
| 29 | 80 | 70 | 60 | 70 | 72 | 72 | 110 | 35 |
| 30 | 80 | 80 | 75 | 75 | 72 | 77 | 104 | 40 |
| 31 | 80 | 80 | 75 | 80 | 70 | 80 | 113 | 22 |
| 32 | 75 | 85 | 70 | 75 | 74 | 76 | 98 | 25 |

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